



P.O. Box 449 Newtown, PA 18940
V 215.369.7778, F 215.369.7780
www.deltaservicesgroup.com
info@deltaservicesgroup.com

MEMORANDUM

Date: 9/14/22
To: Bonnie Epstein
From: David Rishel
Subject: Spare Operations Assessment and Recommended Next Steps

This memo summarizes my investigative work over the past 2 weeks, looking into the current situation with the Spare Implementation.

Work Completed

This memo, and its recommendations, are based on the following actions I have taken to look into the current status of the implementation:

- I have reviewed various emails and documents provided by PSTA concerning the implementation of the Spare platform;
- I have also observed one Spare/First Transit/PSTA weekly meeting and listened to a recording of a second;
- I have interviewed personnel from PSTA and First Transit; and,
- I conducted two periods of observation at the First Transit facility; one during the afternoon of Thursday, September 8th, and the second during the morning of Friday, September 9th.

Please note that the investigations conducted were not extensive and that further work is necessary to more precisely develop remedies for the problems observed. However, I believe that I have seen enough to get a sense of the problems.

Spare Performance

There are four main areas of complaint concerning Spare's performance:

1. The schedules produced by Spare are less efficient than those produced by the previous software;
2. Spare's "black box" approach to service delivery management does not permit First Transit's dispatch staff to manually manage and adjust the service;
3. There is no provision in Spare to schedule driver breaks; and,
4. Providing a full audit trail for each trip, to ensure that PSTA can verify that it was ultimately delivered in compliance with the required ADA requirements.

There are reportedly numerous other concerns about the Spare platform, particularly regarding data reporting and other internal controls, but these were not investigated. I will discuss each of these four performance issues below.

Spare's Schedule Efficiency

From a macro perspective, it seems that schedules produced by Spare require more service hours by the contractor to deliver roughly the same level of trips. To determine exactly how much more time is required to deliver the Spare schedules would take a much more in-depth analysis, but both PSTA and First Transit staff agree that this is the reality. According to First Transit, they have had to add 4-5 more routes or "Duties" as Spare refers to them, to perform the same amount of work. In round numbers, the addition of 4-5 extra routes each day is likely costing PSTA something in the range of \$1,000-\$1,500 per day more than before Spare (assuming each Duty costs ~ \$260 and is about 8 hours, delivering 6-8 trips).

The inner-workings of the Spare scheduling algorithm are proprietary and opaque (which is typical with such software), so it is not possible to examine "why" Spare seems to schedule less efficiently.

When PSTA and First Transit have attempted to change the user-defined settings and force the Spare scheduling engine to schedule service using fewer routes, On-Time Performance (OTP) drops from the 90% range into the 70-80% range, which is not acceptable and not in compliance with ADA regulations. Presently, PSTA has wisely opted to favor a higher level of OTP, at a higher cost, to avoid ADA compliance liability.

Service Delivery Management

The design, and clear intention, of the Spare service delivery management approach is that their algorithm will develop optimal schedules and will continually update and optimize each Duty throughout the service day, making manual dispatch intervention unnecessary. Spare's commitment to this approach is absolute, with limited tools available to a dispatcher to monitor the details of each Duty's schedule, and no ability to make manual adjustments to the schedules.

In a traditional paratransit operation, and with most paratransit dispatching systems, the dispatcher is provided with tools to provide visibility concerning the on-time status of service, with an accompanying suite of tools that allow a dispatcher to quickly reassign trips and make other changes, based on real-time changes occurring with the service. Spare's approach does not permit such management. With the Spare system, a dispatcher is able to see vehicles running late and may ask the system to "rematch" a trip (find another Duty to perform the trip), but the system will select where to move the trip. It is not possible to move a trip to a specific Duty.

First Transit staff have complained that often, when their dispatchers try to rematch a trip, the system overlooks vehicles in close proximity to the distressed trip and attempts to move it to some other Duty that is less efficient or that does not solve the problem. It would require a significant analysis effort to understand the extent to which this was true, but I did observe multiple instances of the Spare system being unable to find a rematch solution, when it appeared that there were vehicles close to the distressed trip that could have taken it, with minimal impact to that vehicle's Duty.

The lack of dispatcher control over real-time scheduling decisions has caused frustration and friction between PSTA and First Transit. On the one hand, PSTA expects their contractor (First Transit) to do all they can to manage service delivery, maximize productivity and achieve high OTP. First Transit, lacking the ability to make directed changes to schedules, is frustrated by their lack of control over service and increasingly resentful of PSTA's pressure to manage the service.

First Transit has developed a technique to "trick" the Spare system into reassigning some late trips to specific vehicles, but this can only be done at the end of existing Duty schedules. It is done by extending an existing Duty and giving it an ending location at or near the location of the trip that needs to be moved. By doing this, the Spare system "sees" that Duty as the closest available and the late trip can often be rematched to that vehicle (though this does not always work).

Based on my observations, there are a number of things that First Transit could do to "work around" and "trick" the Spare system into making some real-time changes, but these can only be done by expending additional driver hours and increasing costs.

Management of Driver Breaks

The Spare system is not designed with the ability to define and lock-in a scheduled break for drivers during their scheduled Duty. Because of this, dispatchers must constantly monitor Duties to look for open times to give drivers a break. This is more difficult than it sounds, because Spare re-optimizes and may reschedule trips between open Duty schedules, closing a gap that was about to be used for a driver break. Currently, First Transit has developed a work-around to place vehicles out of service to give drivers breaks, but sometimes this requires the dispatcher to rematch a trip to remove it from a route to create a space for a break and can result in that trip being late.

This problem was identified some time ago and Spare reportedly is working on a solution that will be ready for testing near the end of September.

Permanent Audit Trail for All Trips

US DoT ADA regulations establish clear requirements concerning the amount of time before and after a passenger's requested pickup time that a trip may be executed. There are also rules concerning onboard time, along with on-time performance requirements. Having a clear trail of data that shows when the passenger's trip was initially requested, when it was scheduled and when it was picked up and delivered is an absolute requirement for ADA paratransit. Unfortunately, the Spare platform's process of "rematching" (moving and rescheduling) actually treats the moved or rematched trip as a new trip, originating when it was rematched, and the link to the passenger's original trip request is lost.

PSTA and First Transit are currently using a system of side-notes in an electronic log to preserve a manual record of the link between the new rematched trip and the original passenger trip request, which is effectively cancelled by the rematched trip. Although this stop-gap is a minimal work around for this shortfall, it is extremely cumbersome and slows and effectively discourages the rematching of trips, since the process is so time consuming. Furthermore, any manual notation process such as this

will inevitably miss some transactions and will not provide an easy way to audit past trips. If service were operating well and running on-time, this would be an administrative technicality with little relevance. Unfortunately, the ongoing problems with late trips, moved trips (rematching) and other efforts to improve the service, increase the possibility of ADA complaints about the service, in which case these records will become very important.

Spare is reportedly working on this deficiency, but no fix is expected before November of 2022, with the likelihood of it coming later.

Remediation Efforts

Three of the four major problems examined in this brief analysis (No manual trip adjustments, driver breaks, and trip audit trails) are all fundamental shortcomings of the Spare platform, in terms of PSTA's scope requirements. These are typical and normal ADA paratransit management practices, which should have been included. To Spare's credit, they recognize this fact and are working toward solutions.

As noted earlier, there are many other issues with the Spare platform that PSTA is also working to correct but that were not reviewed in this brief assessment. There have been issues related to reporting, API connections with other software systems, mobile data communications and other "bugs" that have been identified and are being worked on.

For the past year, PSTA had held regular meetings with Spare concerning these issues. Presently, PSTA hosts a weekly 90-minute meeting involving Spare, First Transit and PSTA. The meetings follow an open format and either party can raise topics to discuss and resolve. Though I only observed two of these meetings, my conversations with PSTA staff indicated that the meetings I attended were fairly typical, with no formal agenda, a free-flowing discussion, and a lack of defined next steps, outcomes or deadlines. There is a partial list of open items for Spare to work on, but it is not detailed and is not used to prioritize or guide their remediation efforts. Although these meetings are collegial and they are open to input from all, they do not seem to be leading to a rapid or predictable resolution of the many open items by Spare.

One of the problem areas reported and observed with the Spare platform (schedules that are consistently less efficient than PSTA's previous approach to scheduling) may not be easy to address. As stated earlier, it would take much more study of the Spare approach to scheduling to diagnose how and/or why it seems to produce less efficient schedules. At this point, it is not clear that Spare would be willing to undertake this task, or permit the transparency needed for such an analysis. Scheduling systems are often built entirely around a scheduling algorithm and there are finite limits to how much some algorithms can be tweaked or modified. Better performance from Spare's scheduling algorithm is going to be a longer-term effort that will likely take a year or more and may never be fully resolved.

Recommendations

Based on what I saw, I have a couple of specific recommendations:

- A. Baseline Spare's Scope Compliance: Although PSTA has a working list of identified issues with Spare, both PSTA and First Transit staff talked about other problems with the platform that may require attention. It would be advisable to build on the current discrepancy list and develop a more comprehensive master list of issues, linked back to specific scope requirements. This master list can then be used as a tool to prioritize and track Spare's remediation efforts.
- B. Establish a "Process Action Team" to study dispatch improvements: Currently, there is a theme of frustration among the operations staff regarding Spare's performance and slow pace of improvement. The dynamic that has emerged has been for stakeholders to point out a problem with Spare and to then dump that problem at Spare's feet to solve. It would be better to establish a small team of stakeholders from PSTA, Spare and First Transit to look at ways to operate better in spite of Spare's current limitations. Using a Process Action Team is a LEAN/Six Sigma tool that involves stakeholders experiencing the problem in the formulation of solutions. I can discuss this further if you wish to pursue it.
- C. Standby Drivers: If schedules and OTP continue to flag, First Transit should reinstate the practice of having standby drivers available to cover call-outs and to use limited standby drivers in the field (often called floaters). These Floaters can be strategically placed in parts of the service area where problems are known to occur and are then vectored to locations where they will be well placed to accept a rematched trip from Spare. Though this could become costly, it is a way to help relieve extremely late trips.
- D. Enhanced Status Meetings: The open communication occurring at the weekly Spare stakeholder meetings is laudable and should be preserved. Added to that should be a more formal agenda, written notes of commitments and next steps, and deadlines for those next steps. Without tighter management, it is unlikely that Spare will address the many shortcomings in the near term.
- E. Enhanced First Transit Dispatcher Tasking: Although I only observed First Transit for two days, the tasking among and between the 2-4 dispatch/scheduling staff on duty was very fluid. Many people were doing many tasks, with the result that, during short periods on both days, no one was really watching the service map and trying to work on late vehicles. Although it is true that First is very limited in what they can do to manage service delivery, they nevertheless need to always have eyes on the map, with a clear person responsible for management of improved service delivery and driver communication.
- F. Further Observation and Analysis: This is an extremely complex situation involving not just PSTA, Spare and First Transit, but other subcontractors and, hopefully, Microtransit. I would recommend that we take a deeper look into these areas to not only identify existing problems, but also to spot issues that may arise as Spare is integrated further into the PSTA operation.