Technology Assessment for Coos County Area Transit

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Executive Summary

Coos County Area Transit (CCAT) provides fixed route, intercity, and demand-response services in Coos County, with service concentrated in the towns of Coos Bay/North Bend and Bandon. CCAT is a growing service that is also in the midst of a great deal of change while it undergoes a change in management and transitions from being operated by Coos County to being its own independent transit district.

Summary of Recommended Technology Priorities

Implement a contact center system. High call volume is straining the resources of office staff. A phone system that automatically puts callers in a queue will significantly increase efficiency.

Improve online schedule information, including rider tools and website. Providing better information that riders can access themselves results in better rider satisfaction and reduced calls about basic service information.

Begin procurement for scheduling and dispatch software with a request for information (RFI). It's unclear that a single system will best meet CCAT needs in this area. We recommend more research, starting with less formal outreach to vendors in the form of an RFI.

Procure a SaaS asset management system. A cloud-based system for managing CCAT's vehicles would provide easy visibility into the state of the fleet and may support easy information sharing with the vehicle servicer.

1. Introduction

1.1 Assessment Audience, Scope, and Focus

As Oregon increases its investments in small and rural transit services, those service providers face a complex array of options for technology solutions to help them grow. This assessment is intended to guide decision-making about the procurement and implementation of technology, and considers all aspects of transit operations, from fleet management and dispatching to rider-facing applications.

Our recommendations are based on the landscape of current and future technology options and the unique needs and attributes of the agency. They prioritize the most urgent needs of the agency as well as those that have the largest potential impact.

1.2 Sources of Information

This assessment is based on information gathered in a phone interview with General Manager Sergio Gamino and Kevin Chambers in July, and a site visit by Kevin Chambers in August 2019. After Mr. Gamino's departure from CCAT in August 2019, additional information was obtained through follow-up phone conversations with Operations Manager Andrew Burgmeier and new General Manager David Hope.

2. Current Conditions

2.1 Operations

2.1.1 Fleet

CCAT's current fleet includes:

- 6 cutaways (requiring CDL)
- 8 cutaways (not requiring CDL)
- 1 Trolley bus
- 1 minivan (ADA accessible)
- 2 Transit vans

2.1.2 Services

Current services include:

- 4 local fixed routes
- 2 intercity fixed routes
- Paratransit/Dial-a-Ride in Coos Bay / North Bend
- Paratransit/Dial-a-Ride in Bandon

- Medical transportation contracted with the local coordinated care organization
- VA Shuttle to Roseburg/Eugene

Service expansion to Florence is planned using a recent STIF Discretionary grant in coordination with Lane County.

2.2 Resources

2.2.1 Staffing

1 general manager, 1 operations manager, 1 dispatcher, 1 scheduler, 1 maintenance person, and 13 drivers.

2.2.2 Funding

In addition to state and federal transit funding, CCAT is currently receiving funds through Bay City Brokerage for non-emergency medical transportation; the Coquille Tribe; the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians (CTCLUSI); the Oregon Department of Human Services; the Area Agency on Aging Star of Hope; North Bend Housing Authority; and North Bend School District. CCAT has received $185k in Oregon STIF funds for transit management technology.

2.2.3 Technologies in Place

For demand-response service, CCAT is using Easy Rides from GMV Syncromatics, with paper manifests going out to drivers. All drivers' manifests are sent to each driver to facilitate transferring a trip from one driver to another as needed. Dispatch is done over radio and phones.

3. Agency Technology Priorities

CCAT is interested in:

1. Greater efficiency for demand-response operations, including: automated scheduling, online booking, and the ability to designate certain drivers for certain types of riders.
2. Fixed route tools.
    a. Rider-facing real-time information.
    b. Tablets for passenger counting.
3. Vehicle maintenance tracking for oil changes, lift maintenance, and a mobile online pre-trip checklist.

4. Recommendations

Our recommendations are based on the landscape of current and future technology options and the unique needs and attributes of the agency. They prioritize the most urgent needs of the agency as well as those that have the largest potential impact. They are presented in order of priority, though they can be carried out simultaneously as resources allow.

4.1 Implement a Contact Center System

In current day-to-day operations, Coos Transit's dispatcher is taking a very high volume of calls. If a new call comes while she is already on a call, she must put the first caller on hold to take the new call and ask the second caller to hold. There's no system to track call time or purpose, which could be used to inform staffing and technology investment decisions.

Contact center systems provide call queueing, eliminating the need for staff to manually put incoming callers on hold. Some systems also provide other amenities for callers, such as estimated wait time and the ability for the caller to leave a number and be called back when they are at the top of the queue. Management of the call queue is available to the customer service representative and managers through desktop software or dynamic web page. Detailed reporting allows management to gain insight into time and duration of calls, which can be very helpful in determining staffing levels or quantifying the cost of a particular type of customer service. For call classification, in addition to phone menus, some systems support "wrap-up codes" where the person taking the calls enters the type of call after the call ends.

In the past, contact center systems were generally available only through to a site's private telephone network (PBX). With cloud-based contact center solutions as RingCentral, 8x8, and Talkdesk, this linkage between the PBX and contact center is no longer required, meaning that it's possible to get queueing and related features without needing to make changes to the agency's physical phone system.

Since there are no back-office servers requiring a large up-front investment, the costs at Coos Transit's size may be quite low. It may even be possible for these services to be purchased on a monthly basis or an annual contract under the threshold for a formal procurement.

4.2 Improve Online Schedule Information, Including Rider Tools and Website

A significant amount of staff time is currently dedicated to answering questions over the phone about basic service information. Improving the accuracy and accessibility of online schedule and stop information could save time, especially over time as customer confidence in that information increases.

The fixed route schedules and maps at coostransit.org are displayed in low-resolution images that may be difficult for many users to see. Maps should be larger, and schedules should be

displayed in HTML, making them easy for users to enlarge, and making them accessible to assistive technology like screen readers.

The GTFS (General Transit Feed Specification) data used in Google Maps and other applications should also be reviewed for completeness and accuracy, as this data allows easy access to schedules or trip itineraries. The upkeep of this data is important because if it becomes out of date, users will lose confidence in its reliability and be reluctant to use technology to access service information. High quality GTFS data is also the basis of real-time information, so this work would be helpful in preparation for implementing a real-time system.

4.3 Begin Procurement for Scheduling and Dispatch Software with a Request for Information

Prior management at Coos Transit expressed strong interest in procuring a single-vendor solution that addresses the needs of both its demand-response and fixed route services, as well as management of assets. Such an approach has benefits, namely fewer vendors, fewer independent systems to maintain, and greater ease of use for staff due to a user interface that doesn't require as much switching between applications.

In practice, there are also downsides to the single-vendor approach (also called "end-to-end" solutions) that should be considered before procuring such a system. Out-of-pocket costs for a single system can exceed that of multiple, more specialized systems. The risk of vendor lock-in is increased, as end-to-end solutions are generally not designed to integrate with other vendors. Finally, the features for each mode may be of a lesser quality and improve at a slower pace compared to those of more specialized systems, due to the increased complexity of a one-size-fits-all solution. For these reasons, there is a strong case for larger agencies procuring multiple systems, each specialized for its mode, especially where staff and vehicles are dedicated to one mode or another.

In the case of CCAT, where both staff and vehicles are supporting all modes, the case for multiple systems is not as strong. We are nonetheless hesitant to recommend a single system, as we have yet to review a software solution that combines all modes, provides the highest-value features for those modes, and does so at a cost that is in line with the size of the agency's total budget. Most provide a stronger set of features for demand-responsive services and a reduced set of features for fixed routes. Therefore, there is a strong possibility that CCAT will need to make compromises on its priorities and long-term plans.

To explore the current state of the rapidly shifting marketplace, explore both of the options described above, and develop relationships with a range of potential vendors, we recommend that CCAT begin its formal procurement process with the release of a request for information (RFI) that articulates its key requirements and invites vendors of both end-to-end and more specialized systems to respond. RFIs provide a less structured environment for CCAT to articulate its vision and technical requirements and give vendors a chance to engage with CCAT outside of the constraints of an RFP process. Based on information provided through from the

RFI, vendors can demonstrate what their solutions are capable of and get a better sense for how CCAT operates than can be gained from an RFP process.

CCAT would then be in a better position to understand how feasibly its priorities can be realized under different scenarios. This puts the agency in a much stronger position to select its approach to scheduling and dispatch software, present its final requirements in an RFP, and have reasonable confidence that multiple vendors will be able to make a competitive response.

Based on the experiences of other agencies, we recommend considering the following:

- Wherever possible, provide expectations for the system in as detailed and testable a manner as possible. For example, instead of the vague and untestable “has a user-friendly dispatch interface,” describe a feature that can be objectively verified: “has a dispatch interface that allows drag-and-drop assignment of one or more trips to a vehicle. If the vendor has a different approach, describe.”
- Have CCAT provide its own formatted spreadsheet to responders in which vendors can state which features they are able to provide, as well as a spreadsheet template for vendors to describe the itemized initial and ongoing costs for their systems. For both the RFI and RFP, this will allow the agency to more easily carry out side-by-side comparisons of the different solutions.
- Have respondents present a clear picture for how in-vehicle devices (tablets or mobile data terminals) are sustainable from the standpoints of hardware maintenance, software maintenance, and driver training. We have found that the level of effort required to use this technology as designed is often underestimated.
- Gather clear information about how vendors provide real-time vehicle information to riders. We recommend a real-time system that produces data compliant with the GTFS-rt specification, and makes that data available to third-party apps, like Google Maps, Apple Maps, and the Transit app, under open terms. This will offer choice for consumers in which application to use, and flexibility for the agency in switching systems or using the data in other software. Many vendors only provide real-time information to riders through their own proprietary portal.

4.4 Procure a SaaS Asset Management System

Fleet management could be efficiently conducted using a software-as-a-service (SaaS) system. We recommend SaaS because it has low upfront costs, is easily maintained and updated by the vendor, and can be accessible from multiple devices. A SaaS system may offer the option to conduct pre- and post-trip inspections electronically on a phone app or tablet. Costs may be low enough to be below the threshold for a formal procurement process.

Coos Transit has developed a strong relationship with their vehicle servicer, Tom's Bulldog Automotive, which itself uses a sophisticated online tracking service. It may be possible to provide Tom’s with limited direct access to Coos Transit’s asset management system. This would reduce double entry of data and increase visibility into the status of vehicles, making preventive maintenance easier.

5. Conclusion

Coos County Area Transit is in a position where technology can make a difference. Through improved engagement with riders and scalable software to support its demand-responsive services, CCAT will be able to scale up, respond to the evolving expectations of its ridership, and meet its requirements for service tracking and fleet maintenance. While the current vendor landscape makes the recommended path for selecting scheduling and dispatch software more complicated, we believe the addition of an RFI will result in greater satisfaction in a system or set of systems that is likely to remain with the agency for several years.

Appendix A

Agency Facts at a Glance

Coos County Area Transit

As of October 2019 unless noted otherwise

Service area	1,596.17 square miles
Service area population, 2018	64,389
Average Population Density, 2018	39.5 people per square mile
Percent Age 65 or Older, 2018	25.8%
Percent Under Age 65 with a Disability, 2013-2017	16.0%
Incorporated Cities in Service Area and their estimated populations as of 2017. County seat is in bold.	• Bandon 3,062 • Coos Bay 16,415 • **Coquille** 3,846 • Lakeside 1,874 • Myrtle Point 2,488 • North Bend 9,566 • Powers 909
Total Count of Routes, Fixed and Intercity	• 3 Fixed route • 4 Intercity routes
Total Route Miles, Fixed and Intercity	• 203 Fixed route miles • 243 Intercity route miles
Total Count of Vehicles Used for Service	16
Total Count of Drivers	13 (paid)
Total Non-Driver Paid Staff	5
Total Trips, 7/2018 to 6/2019	59,661
Total Vehicle Service Hours, 7/2018 to 6/2019	17,222
Total Vehicle Service Miles, 7/2018 to 6/2019	239,132
Total operating budget, 7/2018 to 6/2019	$1,268,954

Appendix B

In-Vehicle Technology Landscape

Much of the value in technology for transit agencies lies in the ability to gather accurate data about vehicles operating in the field. Such data, especially when acquired and transmitted in real time, can make the work of dispatching easier, provide service information to riders, and support fleet management. In-vehicle hardware thus serves as a lynchpin to enabling a range of benefits.

Types of Equipment

Tracking Dongles

Dongles (a small piece of computer hardware with a wireless connection) are equipped with GPS and have data connectivity through a cellular network. They are generally located under the dash and do not require, nor allow, interaction from drivers. Many dongles also have sensors that can detect certain driving behaviors such as hard braking and hard turns.

Purpose-Built Mobile Data Terminals

Mobile Data Terminals (MDTs) are ruggedized computers loaded with a rudimentary operating system capable of running only a limited set of software applications approved by the hardware manufacturer. Like dongles, they have built-in GPS and data connectivity.

Stand-Alone Tablets

Stand-alone tablets play the same role as purpose-built mobile data terminals, but use a standard tablet operating system (usually Android, sometimes Apple's iOS) that allows for a range of applications to be loaded. Some tablets are ruggedized models while others are consumer-grade equipment with ruggedization achieved through specialized mounting and enclosures.

Vehicle Hardware Platforms

Vehicle hardware platforms go beyond stand-alone tablets by providing a single integrated solution to managing a range of in-vehicle data-generating and data-consuming technologies. In a setting where MDTs, cameras, automatic passenger counters (APCs), stop annunciators, engine monitors, and other devices all require data connectivity or location information, platforms can provide a single connection to the cellular network, reducing ongoing costs.

Hardware Comparisons

Comparison of Capabilities by Device Type

Device Type	GPS & Data Connectivity	Driver Manifests	Open App Platform	Integrates Multiple Hardware Systems
Tracking Dongle	✓	✖	✖	✖
Purpose-Build MDT	✓	✓	✖	✖
Stand-Alone Tablet	✓	✓	✓	✖
Vehicle Hardware Platform	✓	✓	✓	✓

Comparison of Costs, Training, and Maintenance by Device Type

Device Type	Upfront Cost	Ongoing Cost	Driver Training	Software Updates	Flexibility
Tracking Dongle	Low	Low	None	None	Low
Purpose-Build MDT	Medium to High	Low	Medium	Rare	Low
Stand-Alone Tablet	Low to Medium	Medium	Medium to High	Frequent	High
Vehicle Hardware Platform	High	Varies	Medium to High	Varies	High

Planning for the Equipment's Full Lifecycle

Purpose-built devices such as MDTs, APCs, and stop annunciators, though more sophisticated pieces of hardware, are similar from a maintenance standpoint. Support for such equipment is generally available, sometimes exclusively, from the manufacturer or distributor.

Other equipment, most notably Android tablets, requires significant ongoing maintenance to keep them free of bugs and security vulnerabilities, comparable to how computer workstations do. Because the configurations can vary greatly and because the software and apps are updating rapidly, managing this effort is complex and can easily outstrip the resources of agency IT departments. Many of the most affordable methods for procuring tablets, such as through cellular network providers, include no software support plans.

We recommend that maintenance of this equipment be contracted out, either to the equipment vendor, to a capable managed service provider, or to "managed mobile services providers", who have specialized expertise in this domain.

Appendix C

Scheduling Software for Multiple Modes

Scheduling software can be used to plan services, facilitate dispatching, track information from in-vehicle hardware, and assemble the necessary data for reporting to funders. While these functions are critical aspects of any transportation provider, currently available software has generally been created to support just one of two service modes: fixed routes or dial-a-ride/paratransit. This leaves small agencies, which are more likely to operate a blend of fixed and flexible services, without a great solution to meet their needs. The result is often that small agencies find software that meets some of their needs, and then combine it with other systems and/or create workarounds to accommodate modes it's not intended to support.

Three Strategies

A Single System Optimized for One Mode

The current market provides options for technology designed to serve one mode: either fixed route or dial-a-ride/paratransit. A transit provider may choose to focus resources on one of these systems, and opt for low-cost and low-technology methods of operating the other mode.

- Pros
    - Available now
    - Solutions are mature
    - Generally affordable
- Cons
    - Lots of operational workarounds for non-optimized modes
    - Key desired features may not be possible, even with workarounds (e.g., GTFS-RT)

Multiple Specialized Systems

This is an option if a provider has resources to procure and implement multiple solutions. Ease of implementation and ongoing use will depend on how easily each system supports integrations with others. It may be possible to partially reduce the complexity of procurement by releasing a single RFP that requires vendors of each specialized system to work together to create a single proposal with a plan for integration between the systems.

- Pros
    - Each system is more likely handle its domain well
    - It may be easier to leave a vendor if a better option is available
- Cons
    - Managing shared resources may be challenging (e.g., buses switching between fixed and DR)

A Single System Designed for Multiple Modes

This is currently the least-developed product available, so a provider will likely face challenges finding the right fit for its multiple service modes. A provider should take great care to confirm that each mode is adequately served by the technology, and consider starting with a pilot before committing to any long term investment.

- Pros
    - If well designed, greater ease of use due to not needing to switch contexts
- Cons
    - Higher risk of vendor lock-in

Assessing Future Possibilities

With the marketplace offering primarily single-mode scheduling software, it's unclear what good solutions exist to support small rural transit agencies in their operations. As small transit providers in Oregon seek to procure and implement new technology to support their services, further research is needed to find out what options may be available. This research will necessarily be highly detail-oriented and require familiarity with both the technology and the needs of small transit agencies.

Appendix D

An Introduction to SaaS

In the last 15 years there has been a behind-the-scenes but fundamental shift in how software is provided to businesses. There has been a shift away from server and work-station-based software that is installed on the premises of the business ("on-prem"), with licenses purchased as a capital expense. In its place comes software as a service ("SaaS", pronounced "sass"), where web-based software is hosted on computers located in a data center and managed by the company that develops the software.
The SaaS model for software provision has a number of key benefits:

- Costs can be lower, especially initially, as there is no purchase of licenses involved.
- Management of the software and the servers on which it resides is fully in the hands of the vendor, reducing the need for agencies to have in-house expertise.
- Because management of software hosting is in the hands of the software developer, upgrades and scaling can be much easier than with on-prem systems.

The benefits are significant enough that the SaaS model has now overtaken on-prem to the degree where many on-prem systems are no longer being actively updated and are considered legacy systems due for eventual replacement.
SaaS-based systems are rapidly becoming the only option in many sectors, so it's important to understand the key points to use one successfully:

- **Agency-side connectivity.** A central risk with SaaS software is loss of access to it due to an interrupted internet connection. With scheduling and dispatch systems, even brief down time can paralyze operations. For this reason, some of the savings that may be found with a SaaS solution should be invested in redundant network connections. In an urban environment, this is usually a matter of supplementing a more reliable business class service with a lower-cost service aimed at consumers, with equipment that automatically switches between the services when needed (a process called "fail-over"). In rural areas, there often is not a lower cost wired service to provide fail-over. In this case a cellular service (Verizon) may be used.
- **Vendor-side uptime.** The SaaS provider can also be the cause of downtime. In any procurement of mission-critical SaaS software systems, we recommend a thorough evaluation of the vendor's service level agreement (SLA), which outlines what uptime promises they make and how they compensate the customer when the promises cannot be met. It is also reasonable to inquire about a vendor's uptime history and the tools they provide to communicate with customers if a service outage should occur.