

Technology Findings and Recommendations for the “Technology Support for ODOT and Partners” Pilot

**Prepared By
Full Path Transit Technology &
Trillium Solutions**

Funded by the Oregon Department of Transportation

March 20, 2020

Introduction

This document highlights selected findings based on completed evaluations of the operations and technology of seven smaller transit agencies across the state of Oregon in 2019 and 2020:

- Basin Transit Service (BTS), Klamath Falls
- Community Connection of Northeast Oregon (CCNO, serving Baker, Union, and Wallowa Counties)
- Coos County Area Transit (CCAT)
- Gilliam County Transportation
- Grant County Transportation (The People Mover)
- Lake County Transportation, with services provided by the Lake County Senior Citizens Association (LCSCA) and Inner Court Family Center (ICFC)
- Morrow County Transportation (The Loop)

In addition, evaluation of the operations and technology of six other agencies has been started under the auspices of coordinating the six technology projects funded through the STIF discretionary grants:

- City of Wilsonville, branded as South Metro Area Regional Transit (SMART)
- Clackamas County
- Mid-Columbia Economic Development District (MCEDD)
- Oregon Cascades West Council of Governments (OCWCOG)
- Tillamook County Transportation District (TCTD)
- Washington County, with Ride Connection as the subrecipient

“Technology” in the context of this project refers to a range of systems that are transit-specific. It also includes more general-purpose information technology if it significantly impacts an agency’s ability to effectively manage its data or operations. Examples include:

- Scheduling and dispatch software
- Asset management software
- General Transit Feed Specification (GTFS) data
- Systems that, directly or through third parties, provide service information to the general public, such as mobile device apps and GTFS-rt data feeds for real time arrival estimates or vehicle location
- In-vehicle hardware, including:
 - GPS devices
 - Driver-facing devices, such as tablets or mobile data terminals
 - Automatic passenger counters (APCs)
 - Headsigns
 - Stop annunciators
 - Cell network modems

- Electronic logging devices (ELDs)
- “Vehicle logic units”, or other similar devices that in some way integrate the above in-vehicle devices
- Office computer networks
- Electronic document sharing systems and collaboration tools

Examples of technology systems that were not part of the evaluation and assessment effort include: wheelchair lifts or ramps on vehicles, electric vehicles, electric vehicle charging infrastructure, bus engine computers, and diagnostic computers used to communicate with vehicle sensors for engines, transmissions, etc.

Information about the agencies was collected first through phone interviews with agency leadership, and then followed up with on-site visits. On-site visits included interviews and job shadowing with other agency employees, such as drivers, schedulers, dispatchers, and vehicle maintenance staff. Each agency received a draft assessment and was invited to submit comments. The assessment described current conditions and offered recommendations for how to successfully apply technology to their particular size, types of services, and priorities.¹

The focus of this document is on trends that are common to all agencies, along with findings that relate to either regional or statewide coordination — past, current, planned, and prospective. Findings and recommendations specific to each agency can be found in their respective assessments.

Key Findings

Many Agencies Lack Scheduling and Dispatch Systems Designed for Performing a Wide Spectrum of Service Modes at a Small Scale

With fleets numbering between 9 and 12 vehicles, most of the agencies assessed perform some combination of the following types of services:

- Eligibility-based demand-response under a wide range of funding sources
- General public demand-response
- Deviated fixed route (where a portion of the service is demand-responsive)
- Regularly scheduled shopping shuttles, which often take the form of urban or intercity deviated fixed routes
- Urban fixed route
- Intercity fixed route

The transit scheduling and dispatch marketplace has historically been segmented by service mode, with systems tailored to the particular needs of that mode. While this is ideal for larger agencies and those that are able to dedicate each vehicle in their fleet to a given mode, such

¹ <https://bit.ly/odot-transit-tech-pilot>

specialization works against the interests of smaller agencies, which often need to switch vehicles from one mode to another, often within a single driver shift. Smaller agencies also have fewer resources to manage the additional complexity of multiple systems. These scenarios — small size and multi-mode vehicle use — are ones that would benefit more from a single solution focused on key capabilities covering the full spectrum of service modes and robust enough to handle the challenges of highly rural environments, such as intermittent cellular network access.

Current solutions continue to work but tend to be fragile, error-prone, or offer poor accessibility for riders who would benefit from real time service information. They are likely to adapt poorly as agencies add vehicles and provide a wider range of services. Many agencies use paper or spreadsheet-based systems that allow them to manage their diversity of services. CCNO uses a demand-response scheduling and dispatch software (ADEPT) and, depending on the services, limits its use or sets up manual workarounds for other service modes. Other organizations in the state, such as Ride Connection in Portland, have taken a similar approach.

Recommendation: Evaluate and sway the vendor marketplace

With new entrants in the market and the general advance in technology, there may now be better options available. We recommend that ODOT support a survey of the current vendor landscape to evaluate the options that would most benefit rural providers. This evaluation should lead to specific descriptions of the gaps that exist in the marketplace, and the feasibility of those gaps being filled by the private market or by public investments. Active investments should be considered, such as group purchases that grant small agencies access to more technology or the investment in open source software that might be utilized by smaller agencies.

Staff Turnover Presents a Significant Barrier to the Adoption and Maintenance of Technology

Rural transit agencies are highly reliant on a few (and sometimes just one) key staff who are holders of institutional, operational, or technical knowledge. Loss of such workers to retirement or other transitions can have significant negative consequences for maintaining the usability of a technology system.

While individual software and hardware vendors can step in and provide assistance as part of their support contracts, many are not equipped to provide the support that may be needed for a resource-strapped agency undergoing a significant transition. This can leave a critical gap where expertise is lost and recovery is difficult, leading to operations falling back to more paper-based systems.

Recommendation: Encourage documentation and succession planning

Documenting is a highly underrated contributor to organizational resilience. However, it can be challenging to prioritize the documentation of systems when agencies have so much other work

to do and things seem to be working fine as-is. Also, documenting processes that have become rote or are carried out by only one person can be difficult to do comprehensively and clearly.

Internally, agencies can use opportunities such as a new hire or a new volunteer to do this work, since they come with a “beginner’s mind.” ODOT may be able to encourage documenting of systems by providing best practices in succession planning, requesting succession plans for key staff at the agencies, and offering technical support in developing succession plans for managers of technology systems.

ODOT’s own support for agencies and provision of information to agencies via public resources could be improved to allow for streamlined processes at agencies and more resilience. The Regional Transit Coordinator (RTC) functionality at ODOT is a valuable position that allows for a consistent connection between ODOT and local agencies. The RTCs are also stretched thin, and should be more numerous in order to work more closely with each agency in the future. Shared technical resources, a calendar of critical ODOT engagements, and other critical information necessary for agencies to maintain compliance with state requirements should be presented in a redesigned, user-centric agency portal for these ODOT “customers”.

Desire for In-Vehicle Technology Is High; Capacity to Implement, Operate, and Maintain It Is Uncertain

In-vehicle technology presents a range of opportunities for transit. In addition, because Uber, Lyft, and other startups have GPS-enabled mobile devices as a centerpiece of their business model, the technology has captured the imagination of transit operators and riders alike.

We have found two significant barriers to the successful deployment of some types of in-vehicle technology: software maintenance and driver training. The most recent generation of driver-facing tools are typically based on the Android operating system for use on tablets. Android provides maximum flexibility for agencies because it can be a platform to run multiple applications, and offers a welcoming development environment for software makers. It provides a challenging environment to keep the software up to date, however, due to its complexity. The Android platform is also likely to require a more significant investment in training drivers compared to earlier generation, single-function mobile data terminals. We found that many drivers have had little or no experience with tablets, personal computers, or the internet.

Recommendation: Require implementation plans and budgets

We recommend that all projects involving in-vehicle hardware include sufficiently detailed project plans and budgets in their grant requests to demonstrate an understanding of all the aspects involved in a successful implementation. Budgets and timelines should directly address hardware costs, installation, initial and ongoing training, and plans for hardware failures. Plans should speak to adherence to standards, interoperability between systems and how the risks of vendor lock-in and hardware obsolescence are being mitigated.

Regional Efforts to Coordinate on Technology Have Had Mixed Results; Interest in Further Coordination Remains High

In the realm of technology, coordination has primarily taken the form of CCNO sharing access to its StrataGen ADEPT scheduling and dispatch system with Gilliam, Grant, and Morrow Counties. While this has been helpful to the region, these benefits are limited by the fact that the implementations in the counties were only partial; they did not include the mobile data terminals that ADEPT is designed to work with. In Morrow County this has relegated ADEPT use to customer tracking only, while Grant and Gilliam Counties have ceased their use of the system due to their finding that it failed to provide significant benefit over their paper, Microsoft Outlook, and Excel-based systems. This experience indicates two key take-aways:

- Coordination on the implementation of complex systems works best when it initially includes a detailed evaluation of the needs, organizational capacity, and available budget of the participating agencies.
- While sharing a resource such as ADEPT can save money and get tools to agencies that wouldn't otherwise have access to them, the support and coordination of the sharing itself requires ongoing investment in order for the tools to stay aligned with the needs of all stakeholders.

Recommendation: Dedicate staff for inter-agency technology coordination

The chance to save money and share resources makes coordination on technology an attractive proposition. The example of Northeast Oregon shows that good will is not enough to bring success. Dedicated staffing is needed for planning, implementation, and ongoing support. For smaller and more straightforward projects that do not involve complex workflows (e.g. vehicle camera systems), it may be possible to use a small portion of existing staff time at one agency to manage the coordination efforts. More complex efforts such as scheduling and dispatch systems, for example, may require a higher level of effort initially for implementation, followed by a lower level but still dedicated commitment thereafter, either through staffing at a participating agency or through contracting with a third-party vendor.

Technology Efforts Are Closely Linked With Expertise In Other Areas

Several times over the course of the pilot, conversations with agency staff that started off on the topic of technology ended up turning toward service design or other areas. Was the best response to growing demand for general public dial-a-ride a scheduling and dispatch system with route optimization, or was it a shopping shuttle that could make more room for medical trips? Could coordinating directly with medical providers (e.g. scheduling appointments at similar times) to facilitate ride sharing have a bigger impact than using automated scheduling software? An agency is cautious about using technology because it is so short on drivers that it can't afford the risk of losing any due to placing new expectations on them.

In a similar vein, other conversations that started out on technology ended with questions about the finer points of procurement rules. Was it possible for vendor X to get a state price agreement so the agency wouldn't need to go through a formal RFP process?

Technology is not an end in itself, and it doesn't exist in isolation. In the case of transit, technology should usually take a back seat to service design, which is a much greater determinant of the success or failure of a given agency's effort to provide access and mobility for the community it serves. When it comes to getting a vendor under contract, procurement rules can be as formidable for agencies as understanding the technology.

Recommendation: Link technology support with other areas of support

Technology support would benefit from being part of a larger suite of support services aimed at smaller transit agencies, that includes service design assistance, procurement support, recruitment best practices, and other training resources. Developing lines of communication between these groups would enable each to provide a higher level of service by drawing in appropriate resources to the need at hand. As additional technology support is offered by ODOT, through the RTCs, online portals, and other means, it should not be separated from other categories of support but rather integrated into those categories.

Understanding the Total Cost of Ownership and Return on Investment of Technology is Elusive

It appears that many technology projects at smaller agencies are undertaken based on a perception of what has become a "best practice" at other agencies, an assumption that those other agencies are deriving clear gains from the investments, and a further assumption that such gains are readily transferable to the smaller agencies' own situation. This chain of reasoning may be incorrect at every stage. For some of the smallest agencies, the most immediate gains could be made in streamlining back office processes and investing in knowledge about standard business technology practices. Unfortunately, there are too few sources of impartial information available to agencies where they can vet their understanding or be redirected to efforts that are more likely to result in improved operations.

Recommendation: Provide support to agencies exploring technology

Agencies may be able to avoid technology investments that require more effort than anticipated or are unlikely to provide the desired gains by getting technical assistance before they have made grant requests or started a formal procurement process. The exact nature of the technical assistance could vary in scope from a series of phone calls to a more formal assessment similar to the ones conducted as part of this pilot. In all cases, providing an outside perspective knowledgeable in industry trends could help agencies clarify their goals and perhaps avoid a project built on false premises.

Overall Recommendations

Extend Agency Assessments to All Interested Agencies

Anecdotal feedback from agencies found that getting an outside perspective on technology was highly beneficial. Having an in-person conversation about technology can be valuable for an agency in and of itself. In addition, some agencies have reported that finalized assessments have been very helpful in fostering conversations with agency boards and other stakeholders about how to avoid pitfalls and apply technology effectively. These benefits are readily replicable to other agencies across the state.

Invest in Long-Term Coordination

Based on this initial sample of Oregon's rural transit agencies, we recommend expanding on the region's past technology coordination efforts and investing sufficient resources to address the challenges that coordination brings. This applies particularly to the most complex and commonly needed systems, such as scheduling and dispatch systems, Android-based in-vehicle hardware, and transit asset management systems. Geographic and operational similarities among the agencies mean that, if carried out well and sufficiently funded, coordinated procurement and support systems are likely to reap benefits that reduce the aforementioned difficulties small transit services are vulnerable to. Specifically:

- Centralized management of Android device and app updates to relieve agencies of direct responsibility for a highly specialized and rapidly changing domain.
- A robust training resource for all user types of the relevant systems, from drivers to schedulers to financial staff. Such a resource should be available to assist whenever new staff are hired.
- Periodic on-site visits and reviews of business needs, to document processes and ensure that technology is continuing to serve the organization well as its needs grow and evolve.

Explore a Managed Service Provider Model for Technology Support

One promising and common model for support can be found in the managed service provider, or MSP. MSPs are businesses that provide proactive and reactive contracted IT support to virtually every size and type of business. Common areas of support include management of workstations (e.g., operating system updates, anti-virus support), servers, local area networks, and internet connectivity. An MSP that has developed specialized expertise on needs of small transit could address most and perhaps all the needs outlined in this document. Additionally, an MSP that is contracted through a coordinating entity would likely be able to provide services at a lower cost compared to each agency negotiating its own MSP relationship.

Based on the success of MSPs in the wider marketplace and their potential to be adapted to the particular needs of smaller transit agencies, we recommend further exploration of the costs, benefits, and scalability of the model for transit agencies in Oregon that do not yet have dedicated IT resources with transit-specific expertise.

Conclusion

ODOT's one year transit technology pilot exploring the benefits of offering additional technical assistance to small transit agencies has revealed a great deal of information about where agencies stand with respect to technology. It is now clear that agencies are looking for additional support and will put what they learn into action to the extent that their capabilities allow. Continuing the work of the pilot and building upon the lessons learned presents clear benefits for the agencies receiving the support, their riders, and the statewide network.