

Technology Assessment for Grant County Transportation

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Executive Summary

Grant County Transportation (The People Mover) is a small but growing transit agency. It has successfully transformed from a provider of solely demand-response transportation, focused on facilitating transportation to social services, to an agency that serves the mobility needs of the whole population through an impressive network of local and intercity fixed route services. It is vital that the procurement and implementation of technology be tailored to match the particular needs of the agency based on the full range of services it provides. This document provides an approach to doing that based on information collected about those services, the agency's operations, and the regional context.

Summary of Recommended Technology Priorities

Give preference to the flexibility of tablets for in-vehicle hardware procurement. In its procurement process, The People Mover can articulate requirements that avoid dead-end technologies and address its unique needs.

Seek expert guidance in the procurement of scheduling and dispatch software that matches the agency's scale and organizational capacity. A back-end dispatch system is needed to fully leverage in-vehicle technology. Procure in a way that supports The People Mover's unique needs.

Allocate substantial resources for staff training, both during initial implementation and ongoing as needed. Success with implementing new workflows involving technology depends on staff being fully ready and trained to use that technology.

Develop a plan for upkeep of technology, which may include collaboration and/or outsourcing. Maintaining technology can be tricky. Planning for it should be part of procurement. Sharing this responsibility with other agencies may help.

Procure an electronic logging device (ELD) tracking solution; consider combining with a transit asset management system. An ELD system can address a pinch-point in driver scheduling.

Talk with other agencies about what a collaborative technology support resource could look like, and consider playing a leadership role. Getting effective support for technology can be exceedingly difficult for a small transit agency. Joining forces may be a solution.

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 two phone interviews with Angie Jones and Kevin Chambers and Thomas Craig in April and May, and a site visit by Kevin Chambers and Holly Kvalheim in June 2019.

2. Current Conditions

2.1 Operations

2.1.1 Fleet

Grant County's current fleet includes:

- 2 cutaways (requiring CDL)
- 3 cutaways (not requiring CDL)
- 1 minivan (ADA accessible)
- 1 sedan
- 1 Equinox SUV
- 1 Ford Transit w/ 1,000 lb lift

2.1.2 Services

Current services include:

- 2 Deviated Fixed Routes
- General Public Demand-Response
- Medical Transportation (provider for GOBHI and for veterans)
- 7 Intercommunity deviated fixed routes:
 - Prairie City West to Bend

- Prairie City North to Pendleton/Walla Walla
- Prairie City South to Burns
- John Day Northeast to Baker City
- Monument Southeast to John Day
- Monument West to Bend
- Monument North to Pendleton/Walla Walla

Funded to begin in November 2019:

- A new intercommunity deviated fixed route service from John Day Southeast to Ontario

2.2 Resources

2.2.1 Staffing

Transit Manager, 1 part-time dispatcher, 1 relief dispatcher, 1 driver who can dispatch as needed; 10 staff drivers.

2.2.2 Funding

Grant County Transportation is currently receiving funding through the Highly Rural Transportation Grant (HRTG), 5310 formula and discretionary funds, Oregon's Special Transportation Fund (STF), Greater Oregon Behavioral Health (GOBHI), and through upcoming Statewide Transportation Improvement Fund (STIF) formula and an upcoming discretionary grant (\$111,847 toward the purchase of vehicle hardware and software). Funds also come from the farebox.

2.2.3 Technologies in Place

Grant County Transportation recently ceased using Stratagen ADEPT software hosted by Community Connection of Northeast Oregon (CCNO) to track some of its operations. The system's usefulness was limited due to the manual entry required without mobile data terminals. Operations are currently tracked through spreadsheets or on paper.

3. Agency Technology Priorities

Grant County Transportation is interested in a wide range of transit technology:

1. In-vehicle systems, including CAD/AVL, automatic passenger counters (APCs), stop annunciators, and cameras.
2. The People Mover is named as a participant of the iTransitNW real time rider information portal, and is planning to make to bus location data available through the portal once it has procured a compliant CAD/AVL system.
3. The agency is planning to procure a back-end scheduling and dispatch system.

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 certainly they can be carried out simultaneously as resources allow.

4.1 Give Preference to the Flexibility of Tablets for In-Vehicle Hardware Procurement

Grant County has been awarded with \$111,847 toward the purchase of vehicle hardware and software. This purchase of the hardware portion is important in that future technology implementations will need to integrate with the selected hardware.

Within the small transit sector, there is a move away from purpose-built devices and toward more flexible Android-based tablets. More details on the spectrum of in-vehicle device options can be found in Appendix B. An Android-based solution can be particularly valuable to Grant County Transportation since it is subject to Federal Motor Carrier Safety Administration (FMCSA) driver logging requirements. Together with tracking dongles, Android-based devices can provide the needed technology for drivers to track their driving through the new electronic logging device (ELD) requirements.

Grant County Transportation is part of the iTransitNW buying group initiated by Valley Transit in Walla Walla, WA. Procuring through this arrangement may provide significant savings of time and money, but should be vetted to assure that all in-vehicle hardware requirements for the agency can be met, particularly those that pertain to ELD equipment.

4.2 Seek Expert Guidance in the Procurement of Scheduling and Dispatch Software That Matches the Agency's Scale and Organizational Capacity

In-vehicle hardware will have very limited usefulness unless it is connected to back-end software that aligns well with the agency's operations and capabilities. In the case of the People Mover, the most noteworthy attributes of its operations are a small number of vehicles that will soon be spread across both demand-response and fixed-route service modes, and could foreseeably also provide deviated fixed route service. Each mode carries its own set of needs for effective software, and each mode has a range of vendors that provide solutions specific to it.

Procuring a different system for each type of service is likely beyond the capacity of a smaller agency like the People Mover and is not recommended. Rather, we recommend a single system that is centered on demand-response transportation due to its ability to manage the complexity of customer tracking. Some demand-response systems promise the ability to also support aspects of fixed route operations. While a thorough market survey is beyond the scope of this assessment, since such systems could be of enormous value to a number of growing rural agencies beyond Grant County, we further recommend a deeper exploration into solutions that

promise these capabilities with support and engagement from ODOT. For more information on scheduling software for agencies that operate a range of service types, see Appendix E.

One potential challenge to the one-system approach for scheduling and dispatch recommended here is that a system focused on demand-response service may provide poor support of some of the fixed-route hardware that agency leadership has expressed desire to procure, namely automatic passenger counters and stop annunciators. The value in simplicity of a one-system solution may need to be weighed against the value of sophistication of a more robust suite of systems that can support fixed-route-specific technology.

One key decision with regard to software is to choose between an on-premise and a web-based hosted solution. By way of example, CCNO's implementation of ADEPT is located on-premises at its La Grande office. This approach to delivering software, common up until recent years, is rapidly being supplanted by web-based software hosted in the cloud (i.e., in data centers on computers managed by the software vendor). With a responsible vendor, we find this new software as a service (SaaS) approach to be, broadly speaking, superior to on-premise software and should be considered as a solution. More information on SaaS software can be found in Appendix D.

4.3 Allocate Substantial Resources for Staff Training, Both During Initial Implementation and Ongoing as Needed

Making transit technology work requires significantly more than just the effort required during deployment and initial training. Success depends highly on a supportive organizational culture, clear policies that outline expectations for consistent use, and procedures that prepare staff for the many ways that technology can fail.

In particular, driver training should be expected to require significant resources, both during initial implementation and subsequently, in ongoing training, in training new hires, and when problems arise. Issues with technology in the field, which can be difficult to resolve promptly depending on the location of the vehicle, should be anticipated. Positions such as a lead driver, who is particularly comfortable with technology and can be made available to serve as an on-board trainer and troubleshooter when needed, can be particularly useful.

If multiple agencies in the region procure the same or similar technology solutions, more specialized expertise could be made available in some sort of shared resource, which would alleviate the need for more advanced training at each agency.

4.4 Develop a Plan for Upkeep of Technology, Which May Include Collaboration and/or Outsourcing

Plans for maintaining technology hardware and software should be established as part of procurement. In the case of software, maintenance can usually be purchased as part of the ongoing support from the vendor. In the case of hardware, especially tablet-based systems, maintenance can often fall to the agency. Newer Android-based hardware, while providing an open platform that offers greater flexibility to run a wide range of apps, also carries a higher

maintenance burden. Not unlike computer workstations, they can require frequent updates to stay secure against hacking threats.

Likewise, stop annunciators and APCs are often imperfect technologies requiring tweaking and regular attention to achieve the desired level of performance. When vetting options for these technologies, agencies already using the desired equipment should be actively engaged to determine the level of staff support needed.

Technology upkeep, together with training and support, is an area where agencies may see benefit in pooling their resources to have shared access to maintenance support.

4.5 Procure an ELD Tracking Solution; Consider Combining With a Transit Asset Management System

Being subject to FMCSA driver logging requirements for interstate travel places a burden on Grant County that is unique in the region. The implementation of ELD technology would remove constraints on frequency of travel that are currently placed on drivers engaged in service to Washington State. To cut down on the number of independent systems that collect similar data, we recommend that the procurement of technology be combined with the procurement of a transit asset management solution.

Despite Grant County's relatively small size, transit asset management, an activity that is currently being managed capably through paper systems, may benefit from a technology-based solution, especially if that solution is also able to address ELD requirements.

4.6 Talk to Other Agencies About What a Collaborative Technology Support Resource Could Look Like, and Consider Playing a Leadership Role

Among the agencies evaluated in the region, Grant County Transportation is unique in its singular focus on transit, successful track record for growth, ambitious plans for further expansion both in service and use of technology, and service connectivity with neighboring agencies. As such it may be better positioned than its neighbors to address the need for shared technology services.

Whether it be through directly hired staff or contracted services, it may be particularly beneficial to play a leading role in the effort to gain reliable and shared access to the expertise needed to support the systems the People Mover wishes to put into place.

5. Conclusion

As a growing transit provider poised for further expansion, the People Mover is well positioned to make strategic decisions about technology that will positively impact its operations and services for years to come. To set the agency, and regional transportation more broadly, up for

success, procurement and implementation of technology must be undertaken in a planned approach that considers the particular needs that each technology component must meet, as well as the constraints and costs of each solution. The recommendations in this document offer a roadmap of what to consider, with emphasis on the often hidden or overlooked costs of maintenance, training, and support.

Grant County also has a potential opportunity to help shape the future of transit in the region by taking leadership in what technology is procured, how it is implemented, and how it is maintained and supported. Transit providers in Northeast Oregon, which share commonalities in geography, size, and types of services offered, may benefit from coordinating and pooling resources, and the People Mover's organizational capacity and ambition makes it a good candidate to lead that effort.

Appendix A

Agency Facts at a Glance

Grant County Transportation

Figures as of August 2019 unless noted otherwise

Service area	4,529 square miles
Service area population, 2018	7,176
Average population density, 2018	1.58 people per square mile
Percent age 65 or older, 2018	30.4%
Percent under age 65 with a disability, 2013-2017	15.4%
Incorporated cities in service area and their populations as of 2018. County seat is in bold.	<ul style="list-style-type: none"> ● Canyon City 705 ● Dayville 155 ● Granite 40 ● John Day 1,735 ● Long Creek 195 ● Monument 130 ● Mt. Vernon 525 ● Prairie City 915 ● Seneca 200
Total count of routes, fixed and intercity	<ul style="list-style-type: none"> ● 2 Fixed routes ● 7 Intercity routes
Total route miles, fixed and intercity	<ul style="list-style-type: none"> ● 56.37 Fixed route miles ● 921.77 Intercity route miles
Total count of vehicles used for service	9
Total count of drivers	<ul style="list-style-type: none"> ● 0 volunteer ● 10 paid
Total non-driver paid staff	3
Total trips, 7/2018 to 6/2019	40,210
Total vehicle service hours, 7/2018 to 6/2019	12,498.25
Total vehicle service miles, 7/2018 to 6/2019	265,663
Total operational budget, 7/2018 to 6/2019	\$168,740

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. The equipment deployed by CCNO fits into this category.

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.

Connexionz and iTransitNW

Project History and Status

In 2017-18, under the leadership of then-General Manager Dick Fondahn, Valley Transit in Walla Walla, Washington led an effort to create a shared procurement agreement with Connexionz, a provider of transit hardware and related software services. A number of agencies in Washington, Oregon, and Idaho were named as having purchase authority through the agreement, including Grant County Transportation, CCNO, and Central Oregon Public Transit.

The agreement covers two broad areas: participation in the “base project”, a rider-facing real time vehicle location service (itransitnw.com), and purchasing authority for transit technology hardware.

The iTransitNW software service (the “base project”) has been purchased by Valley Transit for a 5 year period beginning January 2019. 7 agencies are named as participants in the base project, of which 2 Oregon agencies are included, Kayak and Grant County Transportation. At this time it is unclear whether additional agencies may be added to the base project. It appears that adding agencies would be a decision to be made by Valley Transit. Costs for adding agencies, if any, are unknown at this time.

11 additional agencies are provided with purchasing authority for hardware outside of the base project, including CCNO and Cascades East Transit in Bend. While not fully verified, current research indicates that named Oregon agencies may procure hardware under this agreement without needing to go through a competitive procurement process. At this point it is unclear if additional Oregon agencies may be added to this list.

Products and Services Offered

The base project includes software for fixed routes, which is installed on in-vehicle hardware and connected to a back-end real time system. Connexionz has also integrated its realtime vehicle software service with a demand-responsive scheduling and dispatch solution developed by CTS Software. CTS Software, however, is not expressly listed in the agreement product list, so iTransitNW participants would likely need to go through a separate procurement to use it. Connexionz hardware includes a wide range of products, including purpose-built MDTs, ruggedized Android tablets, automatic passenger counters, and stop annunciators. These devices may be integrated into a vehicle hardware platform (as described in Appendix A) which is made by Connexionz.

Though the iTransitNW service is provided by Connexionz, participating agencies are not required to use hardware purchased through Connexionz. Connexionz in-vehicle software can be run on any current Android system.

Questions and Considerations

The iTransitNW project potentially offers significant benefits to Northeast Oregon transit riders and operators, particularly if regional coordination results in cost savings. Agencies should carefully weigh their options and seek more information on the following:

- What would be the cost of getting Northeast Oregon agencies added to the base project? At this point it's unclear what opportunities are available.
- How well is the CTS demand-response software integrated with the Connexionz realtime software, and does it provide the features agencies need? As providers of multiple and hybrid (flexible-fixed) service modes, small and rural agencies need scheduling and dispatching software that supports all modes.
- How does this project compare to other available software? Further research is needed to find out the full range of options the market offers, particularly with multiple modes in mind.
- Will this project support open and standards-based data by publishing transit data feeds that are usable by other software? Adhering to data standards and publishing open data promotes a positive ecosystem of technology for riders (e.g. third party apps like Google Maps or the Transit App can provide quality information to riders), and allows transit agencies flexibility and ownership over their data. The iTransitNW project currently isn't producing a GTFS-realtime feed that is usable by third parties.

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. This is the case with the Strategen ADEPT system used by CCNO.

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.

Appendix E

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.

As a paratransit dispatch system, Stratagen's ADEPT software fits in this mode-specific mold. Our Northeast Oregon agency assessments have a focus on ADEPT, both because it's important for operations and it because it represents an existing inter-agency effort to collaborate on technology.

Current Conditions: ADEPT in Northeast Oregon

For any of these agencies, moving forward in efficiency and growth will need to involve taking an inventory of necessary features, both to evaluate ADEPT and to identify requirements for future software procurement. To aid in this process, and to illustrate how a typical single-mode software is used with varying degrees of success to support multiple service types, a description of ADEPT's current use by NE Oregon agencies is below.

	Full Demand-Response (e.g. Dial-a-Ride, Medical, or Paratransit)	Partial Demand-Response (e.g. Shopping Shuttle)	Fixed Route	Deviated Fixed Route
Morrow County	Yes	Yes	Planned	No
Grant County	Yes	No	No	Yes
Baker County	Yes	Yes	Yes	No
Wallowa County	Yes	Yes	No	Yes
Union County	Yes	No	Yes	Yes

Figure 1 — An overview of modes operated by NE Oregon agencies.

Full Demand-Response services are the mode ADEPT was designed for. The CCNO agencies, which have in-vehicle hardware, are able to use the system for scheduling, dispatching and reporting to the extent that their staff are trained and comfortable using the technology. Morrow and Grant counties get little to no benefit from ADEPT because they don't have MDTs or tablets in vehicles. Barriers to the use of the hardware (connectivity, driver training) compromise the usefulness of the system.

Partial Demand-Response services have a mix of scheduled and demand-response elements. The term here is meant as a catch-all to include any fixed/flexible hybrid service other than a deviated fixed route. A common configuration is the shopping shuttle, which picks up passengers in a designated area or location and takes them to another area (usually another town) where it provides demand-response service to various stores. ADEPT does not accommodate these modes well, and any benefits gained from using parts of the system, like tracking mileage or scheduling drivers, are undercut by the labor necessary to integrate it with other systems (e.g. paper scheduling) in use.

Fixed Routes are not intended to be supported in ADEPT. Some CCNO counties enter fixed routes into ADEPT, configured as repeated demand-response itinerary with fixed/scheduled "demand," to track hours, mileage, and ridership. However this doesn't facilitate fixed-route-appropriate dispatching or produce National Transit Database (NTD) reports. ADEPT also lacks features that fixed-route-specific software provides, like connection to rider-facing applications.

Deviated Fixed Routes are also not supported in ADEPT. The fixed route workaround doesn't work for this because it won't capture data for deviations.

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 Northeast Oregon consider a move away from ADEPT and to another system, 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.