

**SOUND TRANSIT ATCMTD APPLICATION
VOLUME 1 – TECHNICAL APPLICATION**

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| Project Name | Next Generation ORCA |
| Eligible Entity Applying to Receive Federal Funding | Sound Transit (lead agency). Partners include: Community Transit, Everett Transit, King County Metro, Kitsap Transit, Pierce Transit and Washington State Ferries |
| Total Project Cost (from all sources) | \$91,613,834 |
| ATCMTD Request | \$10,000,000 |
| Are matching funds restricted to a specific project component? If so, which one? | Yes. Federal funding is limited to system integration and software development to be mainly completed by the System Integrator contract. Equipment will be locally funded. |
| State in which the project is located | Washington |
| Is the project currently programmed in the: <ul style="list-style-type: none"> • Transportation Improvement Program (TIP) • Statewide Transportation Improvement Program (STIP) • MPO Long Range Transportation Plan • State Long Range Transportation Plan | <ul style="list-style-type: none"> • If selected for funding, PSRC will work with Sound Transit to amend the new funding into the regional TIP and STIP. • Project is not required to be in the MPO Long Range Transportation Plan. The project is not a capacity expansion and as such it is not specifically identified in the Puget Sound Regional Council’s metropolitan transportation plan (Transportation 2040). The MPO has provided a letter stating that the project is consistent with Transportation 2040 and is consistent with the region’s growth management plan, VISION 2040. • Project is not required to be included in the State Long Range Transportation Plan. |
| Technologies Proposed to Be Deployed (briefly list) | An account-based, open payment, open architecture fare collection system with flexibility to expand to add additional transportation modes and other agencies. |

Next Generation ORCA is a partnership between seven transit agencies. The ORCA Data Analysis project also includes the Puget Sound Regional Council, the City of Seattle, WSDOT and Washington State Transportation Center at University of Washington



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1. PROJECT NARRATIVE – PROJECT DESCRIPTION. This Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) grant request will complete the Next Generation ORCA fare collection system used by seven transit agencies in the Puget Sound region. The Next Generation ORCA (Next Gen ORCA) project will replace and improve the existing ORCA smart card fare-collection system.

The existing ORCA (One Regional Card for All) smart card fare-collection system has been a success in the Puget Sound region, bringing all seven of the regional transportation agencies together to deliver a seamless, interoperable fare collection solution which regularly receives high customer satisfaction ratings. Design for the existing ORCA system began in 2003, with deployment in 2009. The vendor contract which supports operations and equipment will end in 2021. Over time, the system’s technology has become obsolete and the equipment has reached the end of its useful life and needs to be replaced.

The Next Gen ORCA system will include improvements such as multiple payment options in an account-based system, with open architecture that can accommodate additional modes of transportation and additional transportation providers, improving the customer experience while maintaining a secure fare-collection system. This request for \$10,000,000 of ATCMTD grant funding will complete the Next Gen ORCA fare collection system.

| Scope | Customer Benefits | Agency Benefits |
|--|---|---|
| Replace the ORCA smart card fare-collection system <i>with Next Gen ORCA</i> : an account based system with real time communications, multiple payment options and open architecture for easier updates. | <ul style="list-style-type: none"> • Introduction of a Mobile App • Multiple fare payment options • Faster access to funding, removing the 24-48 hour delay in loading products and E-purse • Enhancements to the customer website • Expansion of the retail network • Seamlessness: free transfers among agencies and transit modes • Ability to support new transportation connections in the future • Continued ORCA fare programs that support access to jobs, reduced fares for low income riders, seniors, youth, and people with disabilities. | <ul style="list-style-type: none"> • Continued leverage to procurement as a region vs individually • Open payment system to evolve with future payment technologies • Open open architecture, able to adapt and evolve • Lower upgrade and improvement costs with modular design • Agency-controlled access to useful data and customer data • Faster roll-out of functionality and upgrades • Supports faster fare collection, improving operations efficiency, saving capital costs and service hours. |

There were approximately 212 million transit boardings in the central Puget Sound region in 2016, with 66% using ORCA cards as their method of fare payment. With the improved Next Generation ORCA project, the usage of electronic fare payment (as opposed to cash) will increase, improving operating efficiency and overall system performance.

Existing ORCA System. The seven Puget Sound transit agencies have used the ORCA smart card system to create easy, seamless fare payment so people can travel more easily on the region's buses, trains, streetcars and ferries. The ORCA card replaced about 300 transportation passes, tickets and transfers when it was deployed. Currently ORCA has:

- Over 450,000 average weekday ORCA boardings and over a million cards in circulation
- More than 2,000 business accounts serving employees, schools and other institutions
- Over 125 add value locations at retail stores
- A network of over 100 self-service ticket vending machines
- New reduced fares options for riders with low income
- New products such as the regional day pass
- Mobile ORCA-to-Go units serving the community with ORCA cards available at fairs, festivals and outreach events across the region.

A simple tap of the ORCA card allows riders to quickly pay transit fares on any transit system and mode in the region. To offer savings and convenience, ORCA cards can be loaded with cash value for individual trips or the value of any regional pass. With each trip, the correct fare, including any transfer value, is automatically deducted. When transferring to other modes and services within two hours, ORCA automatically applies credit from a rider's earlier bus or train trip to any other transit trip within the region. The ORCA system charges customers by deducting value and verifying pass value from an ORCA card in accordance with fare policies established by each transit operator. The system then apportions the associated revenue to each transit operator through an automated financial settlement process.

With approximately 66% of transit ridership utilizing the ORCA system, it has become the primary way most transit customers pay their fare. ORCA processes more than 11 million transactions in a typical month and includes more than 2,700 on-board and off board fare payment devices currently in operation on the transit operators' services, as well as point of sale devices. ORCA sales channels include customer service offices, ticket vending machines, retail sites, automatic customer reload capabilities, agency call centers, a regional mail center and two web sites.

The existing ORCA system, however, is nearing the end of its useful life. With the support of this grant request, the Next Generation ORCA system can build on the success of the original ORCA system by integrating more travel modes (auto parking, on-demand bike lockers, vanpool, paratransit, Transportation Network Companies, TNC's, such as Lyft and Uber) and various payment mediums, while increasing affordability and equity in the region, improving system security and incentivizing more efficient usage of the transportation system.

Key Goals of the Next Generation ORCA Project Include:

- Eliminating the 24-48 hour delay between when customers load value onto an ORCA card and when funding is available to pay their fare.
- Increasing flexibility for customers, including acceptance of multiple fare payment options and the ability for the system to evolve with future payment technology.
- Improving access to ORCA via a mobile app, a customer-oriented website, and an expanded retail network.

- Increasing flexibility to use maturing technologies, no matter how they evolve in the years ahead. The system will also leverage that flexibility to continue to improve the customer experience while maintaining a secure system.

Next Generation ORCA Builds on the Success of the ORCA system. Fare collection technology has advanced greatly since the original ORCA system development began in 2003, with innovations such as mobile applications and open payments with credit cards and smartphones. With the current ORCA vendor contract ending in 2021 and the system’s technology and equipment becoming obsolete, the ORCA Joint Board approved the [ORCA Next Generation Strategy](#) in 2015 and initiated “Next Generation ORCA” to replace the existing ORCA system.

The biggest improvements of the Next Gen ORCA system are: the move to an account-based system, “open architecture” design and adding ORCA payment capability to additional transportation modes. The open architecture approach provides flexibility as technology and Agency needs change. The open architecture will apply to all fare media, system interfaces and transaction formats used for the management, distribution, funding, and inspection of fares. By moving to an account-based system the online card refills will be usable instantly, instead of today’s required 24-48 hour waiting period. The current ORCA card-based system stores value on the actual card and fare transactions are processed offline by the card reader, on-board vehicles and at stations. Because data is only updated once the bus returns to base, the value purchased online is delayed 24-48 hours.

An account-based system stores information in an account in a central location so all transactions are processed centrally and in real time. Next Gen ORCA fare media acts merely as an identifier of the account to the reader. Next Gen ORCA will be designed for both open and closed-loop payments. Open payment will allow Next Gen ORCA to accept contactless credit and debit cards issued by banks and mobile wallets on enabled devices. ([Seattle Transit Blog](#), Oct 5, 2015).

The current ORCA system is based on proprietary architecture owned by the vendor, which restricts the ORCA agencies’ ability to competitively procure updates and equipment. Next Gen ORCA will also seek to design the system architecture in a much more flexible manner. Under an open architecture design with interfaces owned or licensed by the ORCA agencies, the system can be updated or expanded much more easily and competitively. This flexibility and scalability are vital to handle the rapid growth of the region’s transportation network. Through Application Programming Interfaces (APIs), Next Gen ORCA will also include the capability to add other transportation modes to the ORCA payment system, such as auto parking, bike lockers, vanpool, paratransit, carshare programs and TNCs such as Lyft and Uber. The backend interface of Next Gen ORCA allows for pricing programs that provide incentives to take transit, carpool, vanpool or use other non-SOV modes to increase person throughput on our transportation system.

Summary of Technology Deployment. Next Gen ORCA will replace and enhance all components of the existing ORCA system. These components include:

- Fare media and fare value sales channels including customer service offices, third-party retailers, ticket vending machines, call centers, customer website and via mobile app
- Business Account website, fare media, product sales and account management
- Fare collection/validation on all buses, light rail, commuter rail, ferries and streetcars

- Communications infrastructure for fixed and wired platform and wayside fare collection devices
- Central clearinghouse for financial transactions and regional revenue reconciliation, settlement and apportionment
- Fare media inventory and distribution
- Payment processing network
- Data management and reporting
- Customer service support
- Integration with agency-specific front-end and back-end systems such as automatic vehicle location (AVL), Automatic Passenger Counter (APC), and finance systems
- System security including protection of Personally Identifying Information (PII) and compliance with Payment Card Industry Data Security Standards (PCI-DSS)
- Open payment capability
- Mobile applications for product sales and account management
- Communications infrastructure for real-time fare data transmission for all fare collection devices
- Expansion of existing ticket vending machine network to region-wide vending machine fare media and product sales
- Support for future integration of additional transit services and additional modes such as monorail, parking, vanpool, car share and TNCs.

Overarching Objectives. The Puget Sound region has the fastest-growing transit ridership in the country. Transit boardings in the region – increasing by 3.8% between 2015 and 2016 – have grown faster than any other large metropolitan area. Ridership on *all* modes of public transit have increased. (PSRC, “Puget Sound Trends” September 23, 2016 and NTD data). In 2016, the seven transit agencies had approximately 212 million boardings and \$240 million of fare revenue. Replacing and improving the existing ORCA fare collection system in 2021 is extremely important for financial security of the transit agencies.

Next Gen ORCA Project Objectives:

1. Increase customer satisfaction by providing instantaneous availability of loaded value
2. Increase customer convenience by allowing for acceptance of multiple fare media types
3. Improve service for unbanked/underbanked customers by creating programs that make it easier for customers without banking relationships to use ORCA
4. Continue to provide pass programs that cater to business and institutional needs
5. Increase ORCA usage by making ORCA easily usable on all modes of transport
6. Increase market penetration by making ORCA more available
7. Ensure that the system is cost-effective to implement and efficient to operate
8. Lower upgrade and improvement costs by increasing the use of state-of-the-art technology and easily upgradeable modular design
9. Implement an expandable open architecture system that’s able to adapt
10. Improve access to information by making data easier to find, access, analyze and report
11. Assure effective security to meet industry compliance for both customer and system data
12. ORCA Data Analysis can be used to better understand transit travel behavior.

The Next Gen ORCA project team created a graphic providing a quick reference guide detailing the technology that will be part of the Next Gen ORCA system (See Appendix B).

2. ENTITY ENTERING INTO AGREEMENT WITH FHWA. Sound Transit is the regional contracting and procurement agency for the ORCA Next Gen program. Sound Transit is the agency that would be entering into an agreement with FHWA for this grant request.

- The ORCA consortium consists of seven regional transit providers: Community Transit, Everett Transit, King County Metro, Kitsap Transit, Pierce Transit, Sound Transit and Washington State Ferries.
- The seven agencies are working closely with the consultant team to develop and implement Next Gen ORCA.
- ORCA is governed by a Joint Board comprised of executive-level representatives from each of the seven ORCA agencies.

ORCA Data Analysis Partners: Washington State Department of Transportation, Puget Sound Regional Council and University of Washington are also partners in providing analysis of the extensive data collected from the ORCA system.

Next Gen ORCA is Bound by an Interlocal Agreement. The Next Gen ORCA project is governed by the ORCA Joint Board which is comprised of the executive or designee from each of the seven ORCA partner agencies. The partner agencies are bound by an inter-local agreement which spells out the structure of ORCA and the responsibilities of the agencies. Per the executed ORCA Interlocal Cooperation Agreement (see Appendix C), each agency pays its share of the costs to implement, operate and maintain the Next Gen ORCA project. Capital cost sharing between the partners has been agreed to.

Sound Transit Will Manage the Program and Project Funding. Sound Transit will manage the ATCMTD funding to procure the System Integrator contract needed to design the Next Gen ORCA system. Sound Transit will be responsible for reporting and other grant requirements. Sound Transit has experience in managing FTA and FHWA grant programs, including Full Funding Grant Agreements, TIGER grants and TIFIA loans. Sound Transit also has experience in constructing major technology projects funded with federal funding from USDOT. Currently, there is Project Management Oversight Consultant (PMOC) oversight over 12 Sound Transit projects receiving Full Funding Grant Agreements, TIGER grants and TIFIA loans. For each project, the PMOCs have found that Sound Transit has the technical capacity and capability and project controls to effectively administer the capital projects.

Summary of ongoing audits, oversight and reviews of Sound Transit:

- The FTA conducts quarterly reviews of the agency. The FTA also conducts more formal Triennial Reviews. Sound Transit incurred only three findings in 2016 Triennial Review and had zero findings in its 2013 Triennial Review.
- Sound Transit complies with OMB Circular A-133. Accounting procedures and internal controls ensure federal funds are managed in compliance with federal laws and regulations.
- Sound Transit received its 21st clean annual audit. There have been no material weakness findings since the agency began the audits in 1994. Audit reports are shared publicly and presented to the Sound Transit Board of Directors.

- Regular independent audits conducted by Lloyd's Registry Quality Assurance ensure the agency complies with the terms of its ISO 14001 certification, international recognition of how Sound Transit manages its environmental program.
- An audit of the ORCA financials is completed annually. The most recent, 2016 audit, was completed recently with no findings.

3. GEOGRAPHIC AREA SERVED. Next Gen ORCA will be deployed in the central Puget Sound region, a four-county metropolitan area. The central Puget Sound Region includes King, Kitsap, Pierce, and Snohomish counties and 73 cities. The central Puget Sound region is the largest metropolitan area in Washington State and is also the State's economic engine. As one of the fastest growing regions, 1,100 residents are moving to the area per week (US Census Bureau). The four counties cover approximately 6,290 square miles. In 2016, the population of the four counties was over 4 million and employment levels were over 2 million (PSRC).

Information from the Puget Sound Regional Council's [*Draft Economic Analysis of the Central Puget Sound Region*](#):

- **The Puget Sound Region is growing faster than it has in decades.** Population growth has increased each year since 2010, with more than 86,000 new people in the region added between 2015 and 2016. Seattle is the fastest growing city in the nation.
- **The regional population is growing faster than the nation and the state.** Between 2010 and 2015, the region grew by 207,800 people, for a total increase of 5.6%. This rate is higher than the population growth in the U.S. over the period, which grew a total of 3.9%. It was also higher than population growth in the state, which grew a total of 5.0%. The region's population accounted for 55% of total state population in 2015. The region recently surpassed 4 million residents.
- **Regional Job Growth is Outperforming the Nation.** Jobs in the region grew at an average annual rate of 2.7% per year between 2010 and 2015. This rate of regional growth outperformed the national growth rate of 1.8% over the same period. During the last five years, job growth has been especially robust. The region added more jobs than any five-year period since the early 1990s.
- **The Regional Economy is Booming.** The Puget Sound economy continues to grow at a fast pace. In 2016, the region added 59,400 jobs, the 7th consecutive year of job growth.
- **The Region Is Expected To Add 1 Million People and 850 Thousand Jobs by 2040.** The region is expected to continue to grow at a brisk pace in the future. The region is on track to hit 5 million people by 2040. By this time, this growth will count for an estimated 600,000 additional households. In addition, the number of jobs is expected to grow by 850,000 by that time.
- **The Strongest Job Growth Has Occurred in Regional Centers.** The region has plans for managing growth, with Regional Growth Centers serving as locations for dense residential and commercial development. The regional growth centers, just 3% of the urban land area, captured 33% of job growth between 2010 and 2015.

The Region has High Levels of Traffic Congestion and High Levels of Transit Use. Per PSRC's "Stuck in Traffic: 2015 Report," population and employment growth has put an increasing amount of stress on an already fragile transportation system. Overall, growing hours of delay are a concern for the region's economy and quality of life:

- The average Seattle driver wastes 48 hours a year in traffic.
- I-5 through Seattle is the fifth busiest highway section in the United States with 301,061 car trips per day. Seattle is ranked the eighth most traffic-congested city in North America.
- Delay on regional freeways increased 95% between 2010 and 2015
- In 2013, highway delay costs Puget Sound residents and businesses over \$800 million.
- The Puget Sound region has the fastest growing transit ridership in the US. By 2035, transit demand is expected to grow up to 75% by 2035 due to population and employment growth.

Regional Plans Identify Tolling to Manage Demand on the Highway System. The Puget Sound region’s Metropolitan Transportation Plan, [Transportation 2040](#) lays out a financing plan with more reliance on users paying for transportation improvements. Washington State is integrating tolling as a strategic tool to help manage congestion, enhance mobility and generate revenue for future improvements. Transportation 2040 calls for full highway system tolls by 2030. Generally, carpools, vanpools and transit do not pay tolls. Affordable Next Gen ORCA transit fares and tolling the highway system gives drivers an incentive to carpool or take transit – increasing the capacity and person throughput on the highway system.

Major Investments to Increase Capacity of the Regional Transit System. To increase transportation capacity in the region, transit agencies and project partners are building voter-approved BRT, commuter rail and light rail systems. In ideal conditions, an uncongested highway lane can move as many as 1,900 vehicles per hour. A congested highway lane may only see 700 vehicles per hour. In comparison, a light rail train can move up to 12,000 riders per hour in each direction, or 24,000 riders per hour in both directions (Sources: PSRC and Sound Transit Long Range Plan). Currently there is over 20 miles of light rail in service. By 2023, over 50 miles will be in service and by 2040, over 116 miles of light rail will be completed.

Next Gen ORCA must be Operational in time for New Light Rail Extensions. Upcoming transit expansions will dramatically increase already high levels of transit ridership, light rail ridership has grown by more than 80 percent since Sound Transit opened its University of Washington and Angle Lake extensions last year. By 2040, overall weekday system ridership is projected to grow from 147,000 today to up to 695,000.

- By 2021, light rail to the University District, Roosevelt and Northgate will be complete.
- In 2023, trains will reach Mercer Island, Bellevue, Overlake/Redmond, Shoreline, Mountlake Terrace and Lynnwood.
- In 2024, light rail will expand to Federal Way and downtown Redmond.

The Next Gen ORCA system must be operational by 2021 for these new light rail extensions.

The Puget Sound region has one of the largest bus and ferry systems in the country. The Seattle Times reported that Seattle is now the second most bus-reliant metropolis, after San Francisco. Riding the bus is how one out of five — that’s 78,000 Seattleites — get to their jobs. Between 2010 and 2014, Seattle experienced the biggest jump in bus ridership of any major U.S. city. In this period, Seattle’s workforce population grew by about 44,000 — and nearly 19,000 of those people are commuting by bus (42% of the total increase). According to surveys conducted by King County Metro, about 90% of its riders have access to a vehicle, so these are people who take the bus by choice. People are taking buses and trains because they’ve concluded it’s a better option than driving. (Source: Seattle Times “[Seattle sees biggest jump in bus riders of any U.S. city](#)”,

April 11, 2016). The Puget Sound region also moves more people via vanpool than any other place in the country. Vanpool ridership per person in our region is more than 3 times what it is in Los Angeles. Next Gen ORCA will be used on all modes of transit.

4. REAL WORLD ISSUES AND CHALLENGES ADDRESSED BY NEXT GEN ORCA.

Real World Issues addressed by Next Gen ORCA:

- An account-based system with near real-time processing of transactions provides lower operating and maintenance costs and flexibility for expansion, while offering a better user experience expected by today’s technology savvy consumer.
- Next Gen ORCA will have fare instruments and distribution options for a wide spectrum of customers, from the unbanked to those using smart media with mobile products.
- Open payment will provide customers with more options to pay, especially for infrequent and tourist riders.
- Less cash fare payment reduces delay and dwell time for transit, improving efficiency and system performance and saving travel time, especially in downtown Seattle.

A *Needs Analysis* and *Technology Survey* were conducted as precursors to the ORCA Next Gen Strategy. As a result of these efforts, the ORCA Steering Committee determined the next-generation system should be account-based and rely on an open architecture in order to increase the flexibility of the system, and be designed to accommodate both closed loop and open payments utilizing a variety of fare media. Tremendous growth is expected to occur in mobile payments in the coming years and to the greatest extent possible ORCA will be looking for ways to “future-proof” the investment. An open architecture will reduce reliance on a central system supplier for the interface of new devices or services. This flexibility may enable separate competitive procurements designed to lower acquisition costs and encourage responses that incorporate the best products and services.

Moving to an account-based system with near real-time processing of transactions provides lower operating and maintenance costs while offering a better user experience expected by today’s technology savvy consumer. Next Gen ORCA will have fare instruments and distribution options for a wide spectrum of customers, from the unbanked to those using smart media with mobile products such as Apple Pay or Google Wallet.

With a system that accommodates open payments, Next Gen ORCA will seek to leverage new market-driven opportunities for fare payments by interfacing with the financial and wireless industries to accept a variety of contactless, open standard, fare payment media. This will provide customers with more options to pay, especially for infrequent and tourist riders who may not wish to obtain an additional, separate closed loop form of media. By continuing to offer the closed loop component of the system, however, it will ensure that payment media is accessible to all customers including those using transit benefits and the unbanked and underbanked.

Real World Challenges.

The implementation of Next Gen ORCA has challenges that will need to be addressed, including:

- **Multiple Partners:** Seven agencies of different size, modes, complex fare structures, integration with many agency-specific technologies and organizational differences present

program size and complexity challenges. This risk is mitigated by the extensive experience the ORCA agencies have in addressing these issues as part of the existing ORCA implementation.

- **New Fare Payment System:** Account-based fare payment systems with open architecture and open loop payment capability are relatively new to the transit industry. However, this risk is mitigated by working with a consultant team with deep experience in this technology as well as continuing to review lessons learned by regions that are further along with implementation.
- **Timing of Replacement of Current System:** The program schedule is driven by the expiration of the operations and maintenance agreement for the existing ORCA system at the end of 2021 and that most of the ORCA equipment will be at or well beyond end of life. A full analysis of potential mitigation strategies for this risk will be conducted very early in the program.
- **Transition to New System:** Easing customer transition from ORCA to Next Gen ORCA is one of the single most important drivers. The transition period between systems includes customers using ORCA media at the same time as Next Gen ORCA equipment is being installed. Making this transition as seamless as possible will likely require the current ORCA vendor to provide support in allowing new Next Gen ORCA system components to interface with their ORCA backend system. To address this challenge, the existing vendor will be engaged early in the program.
- **Communication with Public:** Negative publicity during the implementation may have significant impact on the success of the project both in terms of political support and user acceptance. This challenge will be mitigated by continued customer focus and engaged agency Public Information Officers.
- **Staffing Resources:** Program success requires the agencies to have the ability to commit to the staffing support required to participate throughout the Next Gen ORCA program timeline, including Site Managers, Subject Matter Experts (SMEs), and other agency-delegated point people. Additionally, in order to achieve alignment within each agency, there are expectations that regular communication is happening within the agencies. This risk is being mitigated by providing a three-to six-month look-ahead with anticipated resource needs prior to beginning each program phase and major task. Steering Committee members will commit appropriate staff as required. The ORCA Steering Committee is charged with informing and advising the ORCA Joint Board on program status, budget, risks, and issues. The ORCA Steering Committee consists of individual agency members selected and appointed by their agency Joint Board Member. Committee members constitute a cross-section of leaders with expertise in fare collections, policy, technology, operations and customer service. The Steering Committee has program scope and schedule authority within the budget authorized by the Joint Board.

5. TRANSPORTATION SYSTEMS AND SERVICES INCLUDED IN PROJECT.

One of the main goals of Next Gen ORCA is to expand the transportation modes using the system. The ORCA card is transferable throughout four counties, seven transit agencies and multiple modes, providing the rider a seamless commute without the concern of how payment will be made. Next Gen ORCA will be designed to be flexible to allow expansion of additional modes and additional transportation providers in the future. Various trip planner mobile apps access all ORCA partner systems users making commute planning user friendly.

The Next Gen ORCA will be used or integrated with the following transportation systems:

| Mode | Service Provider |
|--|---|
| Modes Included in the Next Gen ORCA Phase 1 | |
| Bus Rapid Transit, express buses and local bus service | King County Metro, Sound Transit, Everett Transit, Community Transit, Pierce Transit, and Kitsap Transit |
| Light Rail | Sound Transit |
| Commuter Rail | Sound Transit |
| Streetcar Rail | City of Seattle and Sound Transit |
| Passenger Only Ferries | Kitsap Transit Foot Ferries and King County Water Taxi |
| Auto and Passenger Ferries | Washington State Ferries |
| Additional Modes to be Added in Next Gen ORCA Phase 2 | |
| Parking Facilities | Sound Transit, King County Metro, WSDOT, Community Transit, Kitsap Transit, Pierce Transit, and Everett Transit |
| Car Share | Car2Go, Zipcar, ReachNow, etc. |
| TNCs | Lyft and Uber, etc. |
| Bike parking (lockers, bike cages and bike barns) | Sound Transit, King County Metro, Community Transit, Kitsap Transit, Pierce Transit, and Everett Transit |
| Paratransit | King County Metro Pierce Transit , Community Transit, Kitsap Transit, and Everett Transit |
| Vanpool | King County Metro Pierce Transit , Community Transit, and Kitsap Transit |
| Monorail | City of Seattle |

6. DEPLOYMENT PLAN / PLAN FOR LONG-TERM OPERATION AND MAINTENANCE. The seven ORCA agencies have signed an Interlocal Cooperation Agreement establishing roles and responsibilities; allocation of revenue from the ORCA system; funding commitments; and allocation of regionally-shared costs of operating maintaining and updating the ORCA system. Per Exhibit D-1 in the Interlocal Cooperation Agreement, the Joint Board adopted a cost-sharing formula is based on actual cost drivers such as numbers of transactions, numbers of boardings, numbers of customers, dollar volume of use or sales transactions, etc as measured by the ORCA system. The cost-sharing formula is updated annually. The ORCA system also calculates and distributes fare revenue among the partner agencies for all rides and transfers, providing efficiencies for every agency. The seven ORCA agencies have agreed upon the cost sharing percentages for each agency to continue the operations and maintenance of the Next Gen ORCA system.

As the lead agency managing this grant request and the assets procured with the funding, Sound Transit has a long-term financial plan that covers operating costs, debt service and capital replacement costs. Annually the Sound Transit financial plan is updated and extended so the maintenance and operation costs are fully financially feasible and budgeted. An Asset Management Plan covers the management and maintenance of agency assets. The Sound Transit Financial Plan assumes that all the project assets will be replaced at the end of their useful life. Sound Transit maintains a minimum \$300 million reserve for unanticipated expenditures necessary to keep the system in good working condition. In addition, the agency maintains a forecast of the funds necessary to repair and replace existing assets to keep the regional transit system in a state

of good repair, consistent with industry standards. These forecasts are included in the financial plan as a financial commitment.

Next Gen ORCA Consistency with National ITS Architecture. One of the highest priorities of the Puget Sound Region’s Metropolitan Transportation Plan, *Transportation 2040*, is to improve system efficiency with transportation system management and operations strategies. The region has long been using ITS strategies and has a strong foundation of ITS deployments in place. To more fully deploy and integrate ITS, *Transportation 2040* includes a strategy for “Information Exchange and Integration,” where agencies can take advantage of the information available from newly implemented and existing ITS applications while working towards providing integrated multimodal information to internal operations, other agencies, transit users, and freight operators so that travel decisions can be made as efficiently as possible based on the developed Regional ITS Architecture. In 2015, the Puget Sound Regional ITS Architecture was updated to confirm with the current USDOT National ITS Architecture (version 7.1). Next Gen ORCA will conform with National ITS Architecture.

Evaluating the Effectiveness, Benefits and Value of Next Gen ORCA. Next Gen ORCA will be evaluated by customers and the seven ORCA transit agencies. Surveys will be used to get feedback from customers on ease of use and transit agencies will be surveyed to provide feedback on system functionality.

- The Next Gen ORCA project scope includes Beta Testing. Beta testing is performed by a limited number of users (approximately 4,000). Users will test the Next Gen ORCA system and be surveyed on what works and what needs improvement. Improvements will be made prior to roll-out of the Next Gen ORCA system to the general public.
- Key Performance Indicators (KPIs) are reviewed monthly. The KPIs help evaluate the health of the ORCA and Next Gen ORCA system. Examples of KPIs include: number of equipment failures, website outages, system reporting, fare apportionment, etc.
- ORCA Audits are conducted annually. These audits include financial audits, security audits and monthly system scans. These audits are completed to make sure the system is secure from internal and external intrusion.
- Along with an annual rider survey by King County Metro, an ORCA Regional Rider Survey is completed approximately every 2-3 years, gathering customer input regarding the ORCA fare collection system.

Annual Rider-Surveys. King County Metro conducts long-term tracking studies that measure rider satisfaction to better understand where to focus service improvements and to increase rider satisfaction over time. Annual Rider-Surveys include:

- Live telephone survey of residents age 16 and older in King County, Washington
- The most recent survey was conducted December 1st – 30th, 2016
- 800 total respondents; Margin of Error: + 3.5 percentage points
- Consistent with the study’s approach in previous years, EMC conducted a telephone survey using a Random Digit Dial and listed cell phone samples, supplemented with targeted less than \$35K income, Hispanic and Asian customers.
- Interviews were conducted using trained, professional interviewers;
- For Fare Payment, riders were asked questions about the value of service, ease of paying fares while boarding and ORCA cards.

In the [2016 Riders Survey](#), about 75% of riders say they use an ORCA card (purchased themselves or by employers) as their primary method of bus fare payment. When including U-Pass/Husky Card usage, nearly four-in-five riders (79%) use some type of ORCA card. One fifth (21%) use cash or tickets as a primary fare payment method. Metro Operators and Fare Payment are currently the agency’s highest rated service dimensions.

The following reports are also used to evaluate the Next Gen ORCA system

| Reports | Purpose | Data Collected |
|---|---|--|
| Joint Board Program Management Report (quarterly) | <ul style="list-style-type: none"> Provides quarterly overview of the performance of key system activities. Provides data to support business decisions such as the deployment of marketing or system enhancements. | <ul style="list-style-type: none"> System Operations (sales by fare product & sales/channel/location) System Operations- Ridership Transactions/Boardings System Operations–Retailer Report System Operations–ORCA Cards in Circulation and in Use by Type |
| Fare Revenue Report (annual) | Provides the data on farebox recovery, passenger fare revenue by mode and ORCA products | Fare revenue from ORCA E-purse, ORCA Regional PugetPass, ORCA Business Account Program, Ticket Vending Machine tickets, Farebox cash and tickets, human services tickets and mobile ticketing |
| Data Access and Reporting (DARe) | Provides reporting over time or in aggregate for trend analysis. Data includes historical ORCA reporting blended with Next Gen ORCA. | <ul style="list-style-type: none"> -Secures all functional and long term data from the existing ORCA and Next Gen ORCA systems -Data is used to validate that the regional apportionment is correct and pricing is appropriately applied. |

Demonstrating Return on Investment. In alignment with USDOT’s vision for the ATCMTD initiative, Sound Transit and ORCA partner agencies are committed to deploying a fare collection and payment system that will maximize efficiencies based on the intelligent management of assets and the sharing of information using integrated technology solutions. The advanced technology solutions and the lessons learned from the deployment of Next Gen ORCA can be used in other locations, scaled in scope and size, to increase successful deployments and provide widespread benefits to the public and other agencies.

Next Gen ORCA offers operational efficiencies including design and build system components with easy-to-use interfaces and intuitive tools, ability to roll out new functionality and upgrades faster and use technology and administration to enable the ORCA agencies to quickly assess and pilot new technology features and implement them efficiently. The system aims to increase the convenience for consumers, lowering the total cost of ownership for the region, and increasing the use of state-of-the-art technology to create efficiencies and an updatable, modern system.

Next Gen ORCA will offer increased efficiency by providing customers flexibility in how they pay for fares, enhanced unbanked/underbanked programs, business and institutional programs, improved accessibility for all customers, ease of purchase and loading of value. Customers will

benefit from easier fare payment, providing immediate availability of purchased products (as opposed to 24-48 hr. delay), and by making ORCA available through as many channels as possible (such as an expanded retail network and new vending machines).

The long term benefits of the Next Gen ORCA system exceed the costs. Examples include:

- Next Gen ORCA will allow transit agencies to continue fare collection, worth more than \$240 million per year (and growing) of fare revenue.
- Faster boarding times (due to reduced cash payment) are estimated to save 14,303-28,605 annual service hours, with a cost savings for transit agencies of \$1.5 million to \$2.9 million annually.
- Faster fare collection reduces bus dwell time, saving \$5.5 million of expected *additional* transit agency operating costs beginning in 2018.
- The current proprietary fare collection system has a 33% mark-up for fare validators and other equipment. Next Gen ORCA will use modular equipment, available from numerous vendors.
- The Next Gen ORCA mobile app can save capital costs by reducing the amount of equipment needed in the future, including “Smart fareboxes” (saving \$17 million) and the number of ticket vending machines (TVMs) (approximately \$58,000 per TVM, with O&M costs of \$28,800 per device, per year.)

7. CHALLENGES IN REGULATORY, LEGISLATIVE OR INSTITUTIONAL ENVIRONMENTS.

Issues and challenges have been previously identified in question 4. In addition, the seven ORCA agencies have been working on the following institutional and regulatory challenges. Regarding Institutional Challenges, the ORCA smart card fare collection system has been in place in the region since 2009. Next Gen ORCA uses the existing institutional structure, so challenges from institutional partners are minimized. An existing Interlocal Cooperation Agreement has been approved with an agreed upon formula for payment of capital costs and operations and maintenance and an agreed upon formula for revenue sharing.

Regarding regulatory challenges, Next Gen ORCA will encompass all steps necessary to develop an integrated system design following the National ITS Architecture Consistency Policy. The project is following the FTA/FHWA guidelines regarding Systems Engineering for ITS. We have built a Systems Engineering Management Plan specific to the Next Gen ORCA project and will be developing all documentation recommended by the FTA/FHWA to support our project.

8. SYSTEM PERFORMANCE IMPROVEMENTS (QUANTIFIABLE). Next Gen ORCA provides several quantifiable benefits as shown below.

| Benefit | Description | Quantification of Benefits |
|---------------------------------------|---|---|
| Accurate and Reliable Fare Collection | <p>Without Next Gen ORCA, agencies risk losing fare revenue.</p> <p>The useful life of the existing system ends in 2021. The existing system must be replaced and improved.</p> | <p>In 2016, a total of \$240 million of fare revenue was collected through the ORCA system.</p> <p>Next Gen ORCA is needed for new light rail and BRT expansions.</p> <p>There is potential for increased fare revenue with Next Gen ORCA due to more accurate ridership/fare revenue calculations and reporting.</p> |

| Benefit | Description | Quantification of Benefits |
|---|--|---|
| System performance and Operational Efficiencies | <p>Faster fare collection improves overall performance and efficiency of the transportation system; reducing delay and vehicle dwell time, especially in the congested downtown Seattle area.</p> <p>Next Gen ORCA simplifies fare collection and other data collection systems, reducing administration costs.</p> | <p>Next Gen ORCA payment instead of cash speeds boarding by 4-6 seconds. Faster boarding times are estimated to save 14,303-28,605 annual service hours, with a cost savings for transit agencies of \$1.5 million to \$2.9 million annually.</p> <p>Per the City of Seattle’s <i>One City Center Plan</i>, faster fare collection reduces bus dwell time, saving \$5.5 million of expected <i>additional</i> transit agency operating costs beginning in 2018. Private vehicles and delivery trucks also benefit from reducing delay in downtown Seattle.</p> <p>Next Gen ORCA provides integration with agency-specific front-end and back-end systems such as automatic vehicle location (AVL), Automatic Passenger Counter (APC) and finance systems.</p> |
| Travel time benefits for passengers | <p>Cash fare payment is a major source of delay for passengers.</p> | <p>Next Gen ORCA will reduce delays due to fare collection, improving passenger travel time. King County Metro has observed a 25% decrease in dwell time at BRT stops on 3rd Ave in downtown Seattle having off-board fare payment. With faster fare collection, riders can save an estimated 2.9 million hours of travel time worth over \$900 million annually.</p> |
| Equity Benefits – Users Save Money | <p>Using transit helps people save money as compared to the costs of car ownership and parking.</p> <p>Programs that reduce transit fares will be available through the Next Gen ORCA. Examples: ORCA LIFT low income program; ORCA Youth/ORCA summer youth programs; Multifamily ORCA passport and employer-provided business accounts.</p> | <p>People in the Seattle area can save up to \$11,040 annually or \$920 per month by taking transit instead of driving (Source: APTA)</p> <p>A seamless system: riders get free transfers between 7 agencies and 8 transit modes.</p> <p>Next Gen ORCA will improve service for unbanked/underbanked customers by creating programs that make it easier for customers without banking relationships to use ORCA.</p> <p>With Next Gen ORCA, paratransit customers would have improved functionality, improving conditions for people with disabilities.</p> <p>Also, Next Gen ORCA will make it more convenient to re-value accounts. Retail access will be expanded from the existing 125 retail locations to 500-800 retail locations in Next Gen ORCA.</p> |
| Total Cost of Ownership Benefits | <p>Cash fare payment is more expensive to administer– for</p> | <p>Reducing cash fare payment can save costs. Decreasing cash fare payment can help defer or avoid cost of replacing aging farebox system.</p> |

| | | |
|--|---|---|
| <p>Reducing long term costs</p> | <p>collecting, counting and depositing fares; maintaining fareboxes; printing/distributing tickets and transfers; and selling tickets.</p> <p>Next Gen ORCA can reduce future capital costs for Ticket Vending Machines (TVMs).</p> <p>Next Gen ORCA will use modular equipment, available from numerous vendors, not proprietary equipment from a single vender, thus lowering costs</p> | <p>With Next Gen ORCA, King County Metro estimates saving ~ \$17M if new “Smart fareboxes” do not need to be purchased. Next Gen ORCA increases the potential for all-door boarding with less expensive on-board validators.</p> <p>Design standards for new light rail stations include 2-3 TVMs per entrance. The Next Gen ORCA mobile app can reduce the number of TVMs needed. Each TVM costs approx \$58,000. Operation and maintenance for each TVM is \$28,800 per device, per year.</p> <p>The current proprietary ORCA system inflates costs by 33% for equipment with the same functionality, such as new wayside validators.</p> |
| <p>Ease of use/ seamless transfers</p> | <p>Next Gen ORCA is convenient. There’s no need to carry exact fare and it is valid on transit throughout the Puget Sound Region</p> <p>Expanded retail network and Mobile Apps would improve access to ORCA for all residents in the region.</p> | <p>Transfers are automatically counted with Next Gen ORCA. Transfers are free between all modes and 7 agencies.</p> <p>With Next Gen ORCA, there will be no 24-48 hour delay in loading values online or over the phone. This delay is the single largest customer complaint about the existing system.</p> <p>Next Gen ORCA will have expanded access (e.g. gift card network, mobile app, improved website) and more fare media options (ORCA cards, smart phones, etc). 77% of Americans own smart phones, making payment by mobile app very convenient.</p> |
| <p>Safety and Security Benefits</p> | <p>Next Gen ORCA provides increased security of credit card and other personal information</p> <p>Transit is a safer mode of travel as compared to driving. The region is expecting another 8 million annual transit boardings by 2040.</p> | <p>Next Gen ORCA system security includes protection of Personally Identifying Information (PII) and compliance with Payment Card Industry security standards (PCI-DSS)</p> <p>Traveling by transit is 10 times safer per mile than traveling by car. By 2040, 8 million additional transit boardings are expected to reduce approx. one fatality, 43 injuries and 106 crashes.</p> <p>Next Gen ORCA reduces driver/passenger conflicts over fare payment and reduces cash payment, improving driver and passenger safety.</p> |

Reducing Congestion and Costs. Next Gen ORCA will expedite transit passenger boarding and reduce delay in downtown Seattle and other congested business districts. The Next Gen ORCA system will allow contactless smart cards or smart phones to be tapped at a reader, reducing payment time. **Using Next Gen ORCA instead of cash, speeds each boarding by 4-6 seconds,** resulting in reduced vehicle dwell time and improved operational reliability, particularly at high-volume stops like those in downtown Seattle.

Reducing delay caused by cash boardings is a shared objective of all seven transit agencies. Next Gen ORCA can increase electronic fare payment, which will speed boarding. Faster boarding will help maintain schedule reliability and reduce travel time for riders. The share of transferring riders is growing as the agencies move to frequent service networks and inter-modal travel. Next Gen ORCA will be an essential tool for transfers, offering convenience, speed, and savings.

- If ORCA were used instead of cash payment (saving an estimated 5 seconds per boarding), an estimated 14,303-28,605 annual service hours could be saved.
- The operating cost savings from increased ORCA usage range between \$1.5 million to \$2.9 million a year.

| Calculations for service hours saved and operating costs saved | Current | With 95% ORCA Usage Target | Difference (additional boardings) | Cost savings at \$102.43/hr |
|---|-------------|----------------------------|-----------------------------------|-----------------------------|
| Total Transit Boardings in region (2016) | 212,000,000 | 212,000,000 | | |
| Current ORCA Market Share | 66% | 95% | | |
| Non-ORCA Boardings (approx 34% are cash customers) | 72,080,000 | 10,600,000 | 61,480,000 | |
| Estimated % of transfer/non-payment | 33% | 33% | | |
| Cash boardings | 48,293,600 | 7,102,000 | 41,191,600 | |
| Hours of cash fare transaction time (5 seconds per transaction) | 67,074 | 9,864 | 57,211 | |
| Service Hour savings equal 25% of transaction time savings | | | 14,303 | \$1,465,019 |
| Service Hour savings equal 50% of transaction time savings | | | 28,605 | \$2,930,039 |

Avoiding Expected Future Costs and Additional Dwell Time. According to the “One Center City Plan” the City of Seattle must accommodate large scale changes for downtown Seattle over the next 5 years, including the Alaskan Way Viaduct removal, expansion of the Washington State Convention Center and several other large construction projects. The most impactful change will be the transition from the Downtown Seattle Transit Tunnel, currently serving both buses and light rail, to only serving light rail. More frequent light rail service in the downtown tunnel (4 minute headways), requires that the tunnel buses must move to already congested surface streets.

- If nothing is done, the additional buses operating on city streets increase dwell time and increase operating costs up to \$8 million per year. Doing nothing would add approximately an average of 3.5 minutes of travel time to every downtown bus during peak hours. Travel time for private vehicles and freight/delivery trucks would also be delayed and additional operational costs incurred.

- Faster fare collection, including off-board payment, allows more buses to use the corridor as dwell time decreases. Expanding off-board payment and reducing dwell time is estimated to decrease annual transit operating costs to less than \$2.5 million, from the \$8 million mentioned previously – a savings of \$5.5 million per year.

Next Gen ORCA Improves Transfer Efficiencies and Fare Policy. Next Gen ORCA is supported by all seven ORCA transit agencies in the region. An Interlocal Cooperation Agreement has already been signed by the seven agencies establishing the framework, roles and responsibilities, allocation of revenue from the ORCA system, agencies funding commitments and allocation of regionally-shared costs of operating maintaining and updating the ORCA system.

- The ORCA system calculates and distributes fare revenue among the partner agencies for all rides and transfers, providing efficiencies for every agency.
- In preparation for Next Gen ORCA, the ORCA partner agencies are simplifying and coordinating fare policy.
- ORCA allows transit agencies to offer a more sophisticated fare policy. (For example, ORCA automatically calculate distance-based fares for the rider.)
- One fare collection system improves efficiencies for transfers between different modes and transit agencies. The overall ORCA inter-system transfer average is 20%.
- Ease of transfers between seven transit agencies and 8 modes and simplified fare policy makes transit easier to use and more accessible.

Cash or paper transfers increase the dwell time of a bus. Approximately 49% of King County Metro riders use transfers. ORCA enables riders to transfer quickly and seamlessly among modes. A two-hour transfer credit is built-in for buses, rail, streetcar and water taxis. If a ride within that time period costs more than the first ride, the customer pays only the incremental fare. In contrast, riders who pay cash require separate full payments for each additional trip meaning ORCA saves money for riders transferring between modes or agencies. As the region becomes more dependent on inter-modal transfers, ORCA gains importance as a cost-savings and convenience tool for a growing number of riders.

Improving Equitable Access to Jobs. This project strongly supports the USDOT’s Ladders of Opportunity initiative. The Next Gen ORCA system, used on the extensive and growing regional transit system, will increase connectivity to employment, education and other opportunities. In the Puget Sound region, transit can be much faster than driving congested highways and transit is cheaper than driving and paying for parking. The Puget Sound region added 59,400 jobs in 2016. Using transit and Next Gen ORCA gives people an affordable way to access those jobs.

Example of Transit Travel Time Benefit

| Sample Trip | Number of Jobs Accessed | Approx. Driving Travel Time | Approx. Light Rail Travel Time | Travel Time Reduced by Taking Light Rail |
|---|---|-----------------------------|--------------------------------|--|
| Highline College to Downtown Seattle (18 miles one-way) | Downtown Seattle Growth Center has 154,278 jobs | 60 minutes | 38 minutes | Saves 22 minutes compared to driving |
| Highline College to Univ. of Washington (22 miles) | Seattle / U District has 37,481 jobs | 80 minutes | 48 minutes | Saves 32 minutes compared to driving |

Sources: Google Maps and NEPA EIS. Sample trips assume traveling from Highline College and arriving at the sample destination at 8AM.

Benefits to Employers, Schools and Universities. The ORCA Business Passport program is a comprehensive, annual transportation pass program for employers. Standard pricing and elements are available for employers with 20-499 employees. Employers with 500 or more employees receive custom pricing and the option to include vanpool/vanshare subsidies and the Home Free Guarantee program.

- 2016 fare revenue from Employer Business Accounts was \$150 million (Employer Business Accounts are 63% of ORCA revenue)
- University of Washington’s “U-Pass” was one of the first universal student pass programs, beginning in 1991. About 56,000 UW students and employees have an annual U-Pass.
- Employers, Schools, Universities - More than 2,000 businesses manage their ORCA accounts online (Amazon, Microsoft, Starbucks, Expedia and all major hospitals)
- 54% of commuters in downtown Seattle take transit. Most of those riders are using the existing ORCA system.
- The growing light rail system will provide fast, reliable access to 433,000 jobs and six colleges/universities

Reducing Transportation Costs for the User. Public transportation plays a key role in reducing transportation costs and improving access to job opportunities. Cities with good transit services can significantly improve the jobs-housing balance and reduce the cost of job access, especially to low-income families. According to the FHWA’s Livability Initiative (2015), transportation is the second largest expense for most households after housing. Households living in the Seattle area spend 31% of income on transportation costs. With transit providing access to employment, shopping, restaurants and other amenities, household transportation costs can be reduced from 31% to 9% of household income.

Next Gen ORCA will be a tool for Affordability and Equity. Taking transit is much cheaper than driving. According to the [APTA Transit Savings Report](#), people in the Seattle area can save up to \$11,040 annually or \$920 per month (6th highest in the nation) by taking transit instead of driving. Seattle has some of the highest parking costs in the country. It costs \$4 per hour to park a car on-street in downtown Seattle and parking garages can cost \$25-\$50 per day. An adult paying the fare for a light rail ride or bus ride would only pay \$2.25 to \$3.25 depending on how far the person traveled. Savings from parking costs alone would be substantial.

ORCA LIFT. Next Gen ORCA will support discounted fares for low-income riders, youth, senior citizens, and those with disabilities. Next Gen ORCA will offer “ORCA LIFT” Reduced Fare Transit Passes to increase accessibility for low-income populations. ORCA LIFT provides a fare discount to all riders who pay with special low-income ORCA LIFT program. With the ORCA LIFT, income-qualified riders can save up to 50% or more on transit fares. The eligibility threshold for a person to qualify for the low-income fare is 200% of the Federal Poverty Level, currently \$23,760 for an individual. Transit agencies have partnered with libraries, nonprofit agencies and Seattle and King County Public Health to administer the ORCA LIFT program, improving outreach to lower-income residents and local community groups. As of April 2017, more than 45,350 ORCA LIFT cards have been issued.

A study published by the Smart Card Alliance (2008, *Serving Unbanked Consumers in the Transit Industry with Prepaid Cards*) noted that 20% of US households have no bank account, and that

these households are more likely than those with bank accounts to be low-income and minority. Next Gen ORCA will offer solutions that aim to accommodate the needs of unbanked and underbanked populations. These programs will make it easier for customers without banking relationships to purchase fare media, take advantage of ride discounts and participate fully in any services ORCA may offer, providing access to

ORCA Outreach, Promotions and Reduced Fare Programs. The ORCA partnership agencies are providing several promotions to assist transit user groups that currently have lower levels of ORCA usage – including non-English speakers and youths. A sample of King County Metro’s outreach programs are outlined in Appendix D. The “Understanding ORCA” educational campaign is designed to increase ORCA use and convert cash customers to ORCA customers by highlighting ORCA features, fare payment options, cost savings for transfers between modes and the discount associated with ORCA LIFT. ORCA and transit fare information has been translated into multiple languages including Korean, Russian, Somali, Spanish, Tagalog, and Vietnamese.

ORCA Youth Programs. Youth programs increase ORCA use across the region, maximizing benefits to all transit agencies and the City of Seattle. The ORCA Youth program distributes approximately 22,390 pre-loaded \$10 ORCA cards to high school students across the region who do not have an ORCA card. The program includes staffing for an outreach team to provide mobility education for youth and parents so they know how to use transit and how to load additional value on their ORCA cards. The ORCA Summer Youth Promotion offers a discounted fare during summer break 2017 (July and August). The purpose of this program is to test whether a reduced summer ORCA youth fare can significantly increase ORCA youth ridership, ORCA youth market share and overall ridership during the summer, when school pass programs are not in effect. The fare discount will only apply to ORCA fares, not cash fares.

A significant number of transit riders use reduced fare programs. In the peak period, approximately 30% of transit ridership uses a Youth/Senior/Disabled/Low Income ORCA LIFT program. Next Gen ORCA will continue these programs to support affordable access and mobility in the region.

ORCA Provided for Multifamily Housing. The ORCA “Multifamily Development Passport” is an annual transit pass that property owners can offer to residents that:

- Provides a new, attractive amenity to residents
- Improves competitiveness in a crowded real estate and rental market
- Reduces congestion by encouraging transit and facilitates easier parking management
- Promotes environmental sustainability - the passport secures LEED points
- Lessens impact on neighborhood parking
- Ensures a convenient and affordable transportation option

Example of ORCA Provided for Affordable Housing. Capitol Hill Housing (a non-profit housing authority) Seattle and King County are implementing Capitol Hill Housing transit pass, similar to the ORCA Multifamily Development Passport. The Capitol Hill Housing transit pass program provides pre-loaded, monthly ORCA card transit passes to the residents of low income housing with the intention of encouraging transit and all the accompanying benefits of decreased SOV usage like reduced congestion, pollution and the personal financial cost of car ownership.

The Capitol Hill Housing transit pass program would allocate ORCA cards to every apartment in three separate low-income Capitol Hill Housing buildings at the cost of around \$15 dollars per month, while Capitol Hill Housing would also pay \$15 with money from the city. The pilot legislation would permit the Seattle to reimburse Capitol Hill Housing with permit fees that car-share companies like Lyft and Uber already pay to the city. (These fees are already required to be used to alleviate congestion and on-street parking occupancy in residential parking zones.) Capitol Hill Housing has also been renting out unused parking spaces in their buildings to drivers who live in other buildings and also attempting to gauge parking usage with data. The idea is to create a pool of shared parking to reduce the need for developers to create large parking structures.

Affordable Housing Near Transit Stations. ORCA partner agencies make specific outreach efforts to low income, senior and other transportation disadvantaged populations. In 2015, King County Executive and Sound Transit Board Chairman Dow Constantine announced an initiative to create or preserve 700 units of affordable workforce housing in mixed-use, mixed-income communities around transit stations. The community social service agency El Centro de la Raza has moved ahead on its own with private financing and in 2016 completed Plaza Roberto Maestas, a 112-unit low-income apartment complex adjacent to the Beacon Hill light-rail station. (Source: “Next Stop: A Greater Seattle via Transit-Oriented Development,” Seattle Business Magazine, April 2016.)

Next Gen ORCA is Expandable to Add Modes. Next Gen ORCA will be flexible to expand to add additional modes – including monorail, bike parking and auto parking. Currently, auto parking facilities at light rail and commuter rail stations are operating at or above capacity (100%+ utilization). In an effort to increase the number of transit customers accommodated per parking space, improve the efficiency of facilities and services, and to improve customer satisfaction Sound Transit is implementing parking management tools. These tools include: designated parking for HOV and vanpool vehicles; designated parking for transit parking permit holders; parking validation systems and parking fees. Shortly after the implementation of Next Gen ORCA, the ORCA transit agencies plan to implement parking payment to the system.

9. NEXT GEN ORCA IMPROVES THE SYSTEM EFFICIENCY AND REDUCES TRAFFIC CONGESTION. As mentioned earlier, this project offers system efficiency benefits, reducing congestion and delay.

- Next Gen ORCA reduces delay and improves on-time performance. If ORCA were used instead of cash payment (saving 5 seconds per boarding), approximately 57,211 hours of boarding delay could be avoided annually.
- When Next Gen ORCA is used instead of cash payment (saving 5 seconds per boarding), approximately 14,303-28,605 annual service hours could be saved and used elsewhere to increase transit service.
- Operating cost savings from increased ORCA usage range between about \$1.5 million to \$2.9 million a year.
- Expanding off-board payment and reducing dwell time is expected to save \$5.5 million of additional operating costs per year in downtown Seattle.

Safety Benefits Due to Increased Transit Ridership. Taking transit is much safer than driving a personal vehicle. According to an APTA report (“[The Hidden Traffic Safety Solution: Public Transportation](#)”, the most effective life-saving traffic safety tool for a commuter and a community

may be the daily metro transit pass. A person can reduce his or her chance of being in an accident by more than 90% simply by taking public transit instead of commuting by car. This means traveling by public transportation is ten times safer per mile than traveling by auto. Public transit cuts a community's crash risk in half, even for those who do not use public transit. Public transportation is a cost-effective traffic safety strategy.

Next Gen ORCA promotes increased transit ridership by making it easier and seamless to use. In the Puget Sound region there were nearly 212 million transit boardings in 2016 (NTD Data). By 2040 estimates show that there will be over *8 million additional* annual boardings, which translates into a reduction of 95 million VMT in the region. Increased transit ridership and reduced VMT reduces the number of auto collisions, related fatalities, injuries and crashes.

- The 8 million additional transit boardings are expected to reduce approximately one fatality, 43 injuries and 106 crashes by 2040. (Sources: PSRC, [BTS Motor Vehicle Safety Data](#) (Table 2-17). In addition:
- Transit riders have less than a tenth of the per-mile crash rates as automobile occupants, and transit-oriented communities have less than a fifth of the total (pedestrian, cyclist, automobile and transit passenger) per capita traffic fatality rates as in automobile-dependent communities.
- Traffic casualty rates tend to decline in a community as transit ridership increases. Cities where residents average more than 50 annual transit trips have about half the average traffic fatality rates as cities where residents average fewer than 20 annual transit trips.
- Transit-oriented cities have about half the average youth and total traffic fatality rates as more automobile-oriented cities.

Other studies indicate relatively small public transportation ridership gains are associated with proportionately larger reductions in per capita crash rates (Duduta, et al. 2012). For example, analyzing 29 years of traffic data for 100 U.S. cities, Stimpson, et al. (2014) found that a 10% increase in the portion of passenger-miles made by public transit is associated with 1.5% reduction in total traffic deaths. Since only about 2% of total person-miles are currently by public transportation, this means that a 1% increase in transit mode share is associated with a 2.75% decrease in fatalities per 100,000 residents, which translates into a 5% decrease in total traffic fatalities in the 100 cities included in their study. (*Stimpson, et al. 2014, p. 6*)

Safety Benefits Due to Reduced Fare Collection Conflicts and Less Cash Handling. According to national and regional transit unions and agencies, many transit operator and passenger conflicts and assaults stem from fare collection and enforcement. Next Gen ORCA will reduce handling of cash fare payment, reduce fare collection disputes and require less driver fare enforcement.

Security Benefits. In addition to the safety benefits, the Next Gen ORCA project will improve data security. Currently a confidential, secure database holds records of every ORCA card, its current value and usage history. The ORCA agencies have planned for multiple layers of system and data security, including data encryption or encoding, the use of passwords and secret questions for access to customer data and controlled access to data. Registration information is stored in the central database only. Next Gen ORCA will allow more methods of payment and will leverage its flexibility to continue to improve the customer experience while maintaining a secure system. To meet these increasing security needs, the ORCA team has specified system requirements with the help of technical industry experts and agency specialists.

Improved Financial Management and Controls. An integral part of the [ORCA Next Generation Strategy](#) includes improved financial management and controls and data management and reporting. Next Gen ORCA requirements include security requirements for protecting physical system components, personal information and credit card transactions and data. A high priority element outlined as part of the system design includes system security that incorporates different methods of authentication because not only do customers expect the system to be very secure, but anticipated regulations will make this feature essential. To meet high security standards, the Next Gen ORCA consultant team is required to have expertise with system security and compliance with all pertinent regulation, such as PCI, the Payment Card Security standards for securing physical components, personal information, and credit card transactions (PCI, EMV, NFC payment standards).

According to the Federal Reserve Bank of Boston (“[The Contactless Wave: A Case Study in Transit Payments](#)”), one transit authority estimated revenue loss due to fraud and fare evasion to be five percent of its annual fare revenue. Next Gen ORCA will benefit the financial security of participating agencies. According to the Transit Cooperative Research Program’s “[Project A-1 Fare Policies, Structures and Technologies](#)”, a primary advantage of electronic payment methods include improved revenue accountability and security, in terms of improved ability to track transactions and discourage employee theft or mishandling of fare revenue.

Environmental Benefits. Increasing transit ridership and reducing vehicle miles traveled and associated emissions is also a goal of the region. The transportation sector is the biggest contributor to greenhouse-gas emissions locally, and transit is a major tool for reducing emissions.

- The more people utilize public transportation, the more emissions and fuel consumption are reduced. If 10,000 drive-alone commuters left their cars at home and took transit instead for a year, fuel consumption would be reduced by 2.7 million gallons annually (2016 Washington State Public Transportation Plan).
- Reducing delay and providing more transit service reduces SOV trips and decreases VMT, improving the region’s air quality. Next Gen ORCA will develop the capability to interface with other modes that improve air quality, such as secure on-demand bicycle lockers at transit stations/centers.

10. VISION, GOALS, AND OBJECTIVES FOR THE PROJECT - NEXT GEN ORCA

VISION. The ORCA Steering Committee has adopted the follow Vision Statement: “*A flexible and secure system offering customers convenient transportation payment options.*”

Indicators of success include:

- Delivery of a stable, secure and cost-efficient system
- A system that will scale and evolve as technology, agency and customer needs change
- Delivery of major scope items in the fully-launched customer environment by 2021
- Achievement of customer satisfaction throughout the transition
- Eventual increased adoption of electronic fare payment
- Completion within the approved budget
- Satisfaction of the operating agencies
- Low equipment Mean Time Between Failures (MTBF)
- High backend availability and system up-time (99.99% or better)

Program Goals & Objectives

Improve customer experience

- Programs for unbanked/underbanked -- create programs that make it easier for customers without banking relationships to use ORCA to purchase tickets, take advantage of ride discounts and participate fully in any services ORCA may offer.
- Business and institutional programs--continue to provide programs that cater to the needs of local businesses.
- Instantaneous availability of loaded value--increase customer satisfaction by eliminating the waiting period for value added to the ORCA cards

Increase ORCA usage

- All modes--make ORCA easily usable on all modes of transport
- Market penetration--make ORCA available through as many venues as possible in addition to the current retail network and ticket machines

Fiscal responsibility

- Lower Total Cost of Ownership (TCO)--ensure that the new system is cost-effective to implement and efficient to operate
- Lower upgrade and improvement cost--increase use of state-of-the-art technology to create efficiencies and design a system that is modular enough to be easily upgraded

Operational efficiency

- Roll out new functionality and upgrades faster--use technology and administration to enable the region to quickly assess and pilot new technology features and implement them efficiently
- Make data easier to access for agencies and public--allow agencies to find, analyze and report information easily

Additional strategic objectives include:

- Provide effective security to meet industry compliance for both customer and system data
- Be an expandable, open architecture system that's able to adapt and evolve
- Allow for acceptance of multiple fare media types

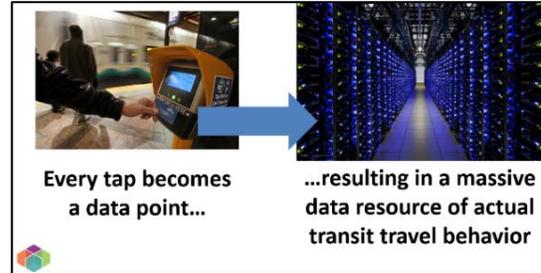
11. PUBLIC/PRIVATE SECTOR PARTNERSHIP PLAN. The Next Gen ORCA project is a multiagency public / private partnership.

- The current seven ORCA Agency transit partners (as listed previously)
- Business Community Partnerships
- ORCA Data Analysis Partners include: WSDOT, University of Washington and the Puget Sound Regional Council.

Business Community Partners: In the Puget Sound region, transit agencies have been partnering with private sector employers for years. The business community is increasingly adding ORCA cards as a staple to their employment benefit package. There are over 2,000 ORCA business accounts which account for nearly 50% of total ORCA system revenue and represents more than 265,000 employees. The employer programs provide access to ORCA, transit vouchers, vanpools, and other benefits to help large employers comply with state Commute Trip Reduction law and offer efficient commute options to employees, students and clients. Microsoft, Amazon, Expedia, Starbucks, University of Washington, King County, City of Seattle and other large employers all have Employee Business Accounts providing ORCA transit passes.

ORCA Data Analysis Project. The ORCA Data Analysis Project is a collaborative effort between the PSRC, Sound Transit, the Washington State Transportation Research Center (TRAC) at University of Washington, and WSDOT to use and analyze actual transit travel use and behavior through ORCA data in order to better inform decision making and resource allocation.

In addition to the financial transaction data, ORCA also functions as a database describing actual transit use. The ORCA Data Analysis Project has developed analytical techniques and systems which provide unmatched insight into regional transit travel behavior. For example, the nine-week data set in 2016 upon which the software was built and tested contains over 11,500,000 origin/destination pairs, allowing detailed examination of transit travel patterns by time of day and for all days of the week. Because ORCA tracks the use of specific transit pass types such as those for low income individual, seniors and disabled riders, it is possible to examine not only the travel patterns of these key rider groups, but determine if specific service improvements are needed specifically to service those groups.



Additional preliminary results include providing quantitative information on:

- **Transfer Behavior.** ORCA allows determination of :
 - The size of specific route-to-route transfer behavior and the stops at which those transfers take place.
 - How that transfer behavior changes during the course of the day
 - The distances walked in order to transfer (by boarding stop location)
 - The time required to transfer (by boarding stop location)
 - The locations where specific rider types (e.g., senior, disabled, low income) are transferring and the statistics that describe those transfers.
- **Origin and Destination Analytics.** The new Sound Transit ridership forecasting model has used the ORCA origin/destination information as part of its calibration/validation process.
- ORCA also allows determination of the average number of transfers required to go from one geographic area to another geographic area, as well as the distribution of the number of transfers required. This allows planners to understand is large numbers of riders are making movements that require an excessive number of transfers.
- **Trend Data.** Analysis of ORCA data provides information on travel behavior changes that occur as a result of major service changes. For example, with the opening of the University Link project, ORCA data are being used to determine the number of riders that:
 - Changed from taking buses with 30 minute headways directly to campus but now use high frequency light rail
 - Changed from taking high frequency bus service to downtown and transferring to other high frequency buses between downtown and the university and now take Sounder trains service and transfer to light rail

- In addition to mode shifts, ORCA data is being used to examine the quality of service actually being experienced (total trip time including transfers) and how those service levels explain the changes in ridership described above.
- The effectiveness of promotions and Commute Trip Reduction (CTR) programs.
Examples of recent ORCA data:
 - ORCA cards with pass products issued by employers have significantly higher transit usage than cards loaded with an e purse;
 - Employee match subsidy and flex time programs corresponds to higher transit usage;
 - How changes in transit quality of service impact transit to work patterns in comparison to changes in pass subsidy levels
- Geolocated ORCA usage data have also been used by King County Metro as input to their design process to size their wireless communication needs, as current ORCA fare card payments are a good estimator of the communications load to be imposed by Next Gen ORCA.
- Market Share Analytics, Better Descriptive Statistics, Better Data Visualization

The ORCA data project and the follow-on project (the Transportation Data Collaborative) being pursued by the ORCA Joint Board are currently developing data use policies that ensure the most widespread public availability of key performance metrics while also ensuring the privacy of individual transit users. These data use policies will be in place prior to the start of Next Gen ORCA.

The ORCA Data Analysis project is also very concerned about understanding and accounting for bias in the data when using ORCA statistics for operations and system planning. Consequently, ORCA data analytics include direct comparisons between ORCA boardings and ridership statistics collected from automatic passenger counters. This allows the analytics system to account for differences between cash payments and ORCA payments by route and stop, thus ensuring that system plans account for these different payment mechanisms. Further extension of the ability to understand how the availability of different payment mechanisms affects transit use patterns will be a significant benefit of the Next Gen ORCA system.

University of Washington Involvement. Students in a University of Washington summer fellowship program called “Data Science for Social Good” used ORCA travel data to help improve bus service. In 2016, a team of UW Ph.D. students took 21 million ORCA-card readings and incorporated the data into a form to reveal where, and when, transit riders go. Knowing where people get on and off the bus, and where they transfer, leads to improvements — such as new bus shelters in popular locations. (Seattle Times, [UW student project taps ORCA cards, unlocks data trove](#), August 21, 2016).

Seattle’s Smart Corridors Project. The City of Seattle is creating “smart corridors” with advanced technology and better information for travelers. The Next Gen ORCA project is being coordinated with WSDOT and the City of Seattle to provide information on the fastest way to travel – including TNC, bus, train, biking and walking times.

Regional Private Sector Support. The Next Gen ORCA project is consistent with the goals of the recent “[Challenge Seattle](#)” initiative. This initiative is led by Former Governor Chistine

Gregoire and is made up of several of the region's businesses including Microsoft, Boeing, Amazon, Chateau St Michelle, JP Morgan Chase, Alaska Airlines, Starbucks, REI, Nordstrom, Expedia, Madrona Venture Partners, Weyerhaeuser, Bill and Melinda Gates Foundation, PATH, Costco, Zillow and Puget Sound Energy. The Next Gen ORCA project supports the Challenge Seattle vision. Challenge Seattle goals include:

- Building a framework that allows those managing our transportation systems, including bus, rail, ferry, bikes, freight, automobiles and commercial vehicles, to work together, using comprehensive data and analytics.
- Using real-time data-gathering technologies and advanced data analytics to plan and schedule system components to optimize performance of an integrated system.
- Payment systems should be coordinated so that all users can pay and access their accounts easily, using either a single card or their mobile devices.
- The ORCA card was developed to bring together multiple transit options on one system. The Next Gen ORCA project will be able to simplify payment, adapt to the new systems, modes and technologies of the future without requiring an overhaul.
- A key performance measure of the Challenge Seattle Initiative is measurement of the number of integrated payment methods. (Source: Challenge Seattle, Working together for a better future, page 12)

12. LEVERAGE AND OPTIMIZE EXISTING ADVANCED TRANSPORTATION TECHNOLOGY INVESTMENTS. Next Gen ORCA will be developed to interface with existing transportation technology. This includes a wide assortment of onboard bus equipment, such as CAD/AVL (Computer Aided Dispatch / Automatic Vehicle Location) systems, APC (Automatic Passenger Counter) systems and fareboxes. These system integrations will come in many different flavors, as all of the agencies have separately procured systems from different vendors at different times. The project will also develop integration with off board advanced technology investments such as turnstiles at the ferry terminals and off-board fare payment equipment installed at BRT (RapidRide) stations.

Integration work will also include interfacing with existing financial systems and asset management systems, which also vary between agencies. System integration work with legacy systems will be a very intensive effort for the project, but is absolutely necessary in the interest of leveraging existing investments and working to achieve smooth system operation. The Next Gen ORCA system will also be designed to interface with many additional transportation technology investments beyond today's ORCA scope, such as tolling, and transportation network companies.

13. TECHNOLOGY DEPLOYMENT SCHEDULE - PROJECT SCHEDULE SUMMARY. The Next Gen ORCA project is in the procurement phase. The System Integrator procurement Request for Proposal is scheduled for release later this year. The execution of the System Integrator contract will be in the 3rd quarter of 2018. The Next Gen ORCA system is scheduled to go live in 2021. Completed milestones and the overall project schedule is outlined below. A project schedule is also included in Appendix E.

Milestones Completed

- Needs Analysis and Technology Survey (2014)
- ORCA Next Gen Strategy (2015)

- Next Gen ORCA Project Team established
- Consultant Team procured to support the project throughout all project phases
- Program Plan Developed
- Systems Engineering Management Plan outlined all necessary tasks and processes
- Vendor Request for Information issued to gather insight into the fare collection landscape and conducted online surveys for current ORCA customers to better understand the needs and desires of customers for a new system.
- The Concept of Operations has been developed and accepted by the ORCA agencies, which will help to set the course for the overall system concept.

| Phase | Deliverables | Milestone Dates |
|--------------------------|---|---|
| Planning | Program Plan, Systems Engineering Management Plan, Request for Information, Concept of Operations, Validation Plan, High Level Design, System Technical Requirements, Business Requirements | Start Date: Q3 2015 Completion Date: Q4 2016 |
| Procurement | Alternatives Analysis, Integration Plan, Technical Specifications, Procurement Strategy, RFP Scope(s) of Work, Vendor Proposal Review | Start Date: Q3 2016 End Date: Q3 2019 |
| Design | Detailed Design Documents, Systems Acceptance Plan, Interface Requirements, Systems Integration Plan, Verification Plan, Transition Plan | Start Date: Q3 2018 End Date: Q2 2020 |
| Development and Testing | Test Plans and Procedures, Test Results | Start Date: Q2 2019 End Date: Q1 2023 |
| Deployment & Validation | Installation Guides | Start Date: Q1 2020 End Date: Q3 2023 |
| Transition | Standard Operating Procedures, Training Materials, User Manuals, Maintenance Manuals | Start Date: Q3 2021 End Date: Q3 2022 |
| Operations & Maintenance | Key Performance Indicators, Evaluation | Start Date: Q1 2021 End Date: Q4 2023 |
| Close Out | Close Out Report | Q4 2023 |

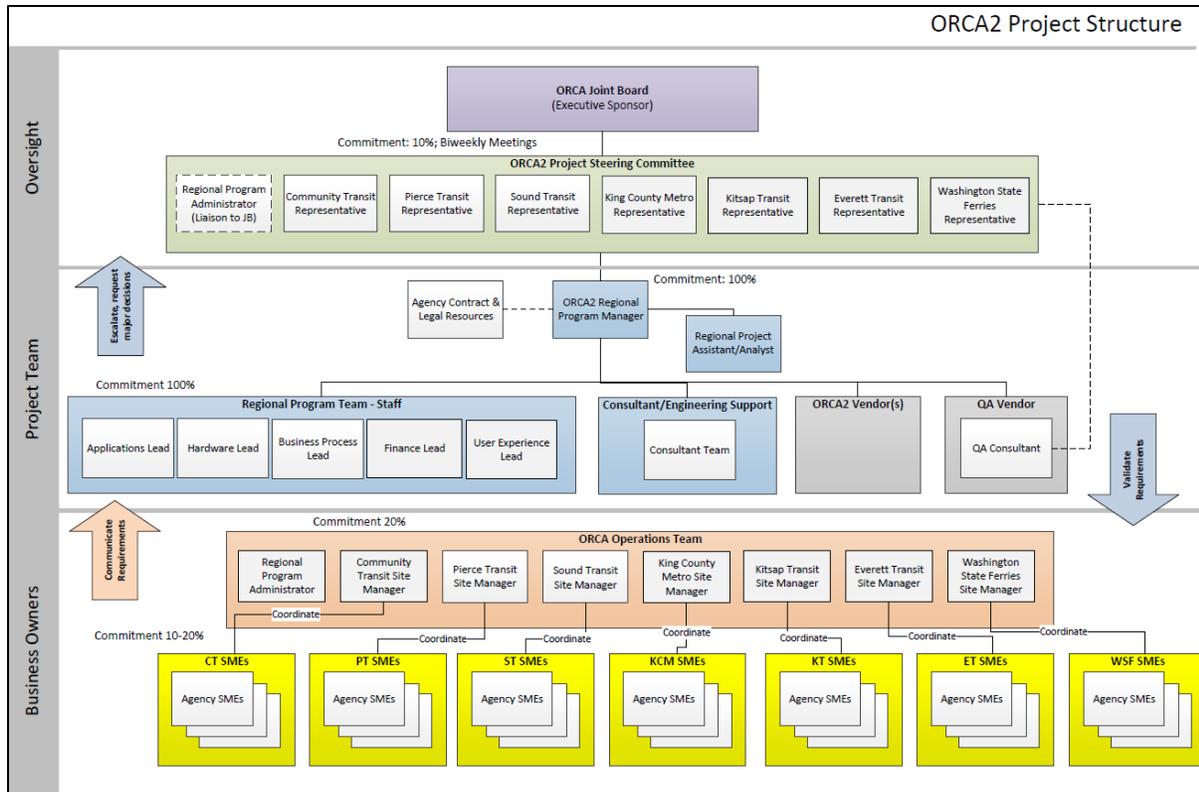
| Procurement Schedule | RFP | Contract Award | Contract Complete |
|---|----------|----------------|-------------------|
| Procurement #1: System Integrator | 9/15/17 | 8/29/18 | 2023 |
| Procurement #2 - Data Access and Reporting (Integrator) | 3/6/17 | 8/11/17 | 2023 |
| Procurement #2 - Data Access and Reporting (Platform) | 5/21/18 | 8/22/18 | 2023 |
| Procurement #3 - Equipment | 9/15/17 | 8/29/18 | 2023 |
| Procurement #5 - Vending Machines | 9/15/17 | 8/29/18 | 2023 |
| Procurement #6 - Mobile Apps | 9/15/17 | 8/29/18 | 2023 |
| Procurement #7 - Retail Network | 1/29/18 | 9/10/18 | 2023 |
| Procurement #10 - Merchant Services | 1/9/20 | 9/22/20 | 2023 |
| Transition & Startup Costs (Media RFP) | 8/21/20 | 5/14/21 | 2023 |
| Consulting & Regional Staffing | 10/13/15 | 2/22/16 | 2023 |

14. LEVERAGING OF THE ITS PROGRAM OR INNOVATIVE TECHNOLOGY INITIATIVES. This project will leverage other ITS projects in the region, including:

- Sound Transit’s **Innovation and Technology program** will fund research, analysis, and implementation of innovative best practices, partnerships, and technologies to increase ridership, improve service, and enhance efficiency of regional mobility. The program is funded at \$75 million.
- Sound Transit has an existing **Research and Development program** with a 2016 lifetime budget of \$20 million. Recent projects completed include: the Permit Parking Pilot Program and Real Time Customer Information at Stations, where customers can use the Sound Transit website to check parking availability at various stations in real time.
- Los Angeles County Metropolitan Transportation Authority, Sound Transit and King County Metro are partnering with UCLA, University of Washington, Lyft and Microsoft for a **Mobility on Demand** demonstration project. This project will test a business model founded on public transit partnerships with TNCs to deliver accessible first and last mile mobility to/from rapid transit stations. Components include: 1) if TNCs can be used as effective feeders into the rapid transit system, 2) whether the key partners can cost-effectively ensure ADA compliant wheelchair accessible vehicles, 3) to what extent gamification and other strategies can be employed to improve equity and accessibility of TNC services. Sound Transit has already partnered with a TNC to provide access to the light rail system for special events. For the March 2016 University Link light rail opening Uber provided direct uberHOP routes to/from the new University of Washington light rail station. Pierce Transit is also developing a Mobility on Demand program for first/last mile connections.

15. STAFFING DESCRIPTION. Next Gen ORCA has a robust project management team and project management plan to support development and implementation of the project. In addition to the Systems Integration work, staffing for Next Gen ORCA spans multiple agencies (Appendix F).

Program Governance and Team Structure. The project structure has been designed to efficiently support the ORCA agencies in meeting the business requirements within the schedule constraint. The following diagram illustrates the three levels within the project structure adopted by the Joint Board. An Interlocal Cooperation Agreement between the seven ORCA agencies will be amended to include the agencies’ obligations and the program roles and responsibilities.



Oversight. Program oversight is provided by the ORCA Joint Board and the ORCA Steering Committee. Both entities are made up of a representative from each of the seven ORCA agencies and are supported by the Regional Program Administrator. The ORCA Joint Board has overall responsibility for the existing regional fare system in addition to the Next Gen ORCA Program. It is the role of the ORCA Steering Committee and Regional Program Manager to inform and advise the ORCA Joint Board on program status, budget, risks, and issues. The Steering Committee and Regional Program Manager are expected to offer recommendations and to provide information relevant to Joint Board’s interest in the regional fare replacement system program.

The ORCA Steering Committee consists of individual agency members selected and appointed by their agency Joint Board Member. Committee members constitute a cross-section of leaders with expertise in fare collections, policy, technology, operations and customer service. The Steering Committee has program scope and schedule authority within the budget authorized by the Joint Board. The Joint Board retains overall program budget authority.

Next Gen ORCA program oversight is provided by an existing cross-agency ORCA Joint Board and Steering Committee. Both entities are made up of a representative from each of the seven ORCA agencies and are supported by the Regional Program Administrator.

Next Gen ORCA Project Team. The Project Team is made up of regional staff dedicated to the planning and implementation of Next Gen ORCA in collaboration with ORCA agency staff. Members of the full time Project Team include:

1. [REDACTED]

3. A collaborative Regional Program Team made up of the following five Leads, who will provide end-to-end oversight of these areas for the duration of the program. These Leads will engage subject matter experts to collect needs and conduct analysis to identify optimal solutions for the region.
 - a. Business Process Lead [REDACTED] will focus on regional and agency functional needs of the new system including those related to distribution, sales, customer service, operations, maintenance, and business accounts in addition to all related reports.
 - b. Applications Lead [REDACTED] will focus on the application and integration needs of the new system based on an open architecture, ensuring adherence to requirements, industry and regulatory compliance, as well as architectural characteristics such as scalability and recoverability.
 - c. Hardware Lead [REDACTED] will focus on hardware specification, selection, integration and installation as well as determining the requirements and strategies for network communications and integration with non-ORCA hardware.
 - d. Finance Lead ([REDACTED]) will focus on financial transaction, reconciliation, settlement and apportionment including reporting related needs, business rules and operating procedures.
 - e. User Experience Lead (TBD) – This lead will focus on all interfaces between the system and agency staff and customers.

This staff team will be assisted as needed by agency-provided procurement and legal staff. In addition, support to the program will be provided by the [REDACTED]

Business Owners. The seven ORCA agencies are the business owners. The Project Team will collaborate with the Site Managers or other Agency-designated point persons, and Subject Matter Experts (SMEs) within each agency throughout the program. The requirements gathering phases will include a range of SMEs from each agency. However, the Site Manager or other Agency-designated point person will coordinate agency review of program deliverables and present a consolidated agency view.

Identification of Key Personnel, Roles and Responsibilities - Key agency personnel roles and responsibilities are listed in Appendix F).

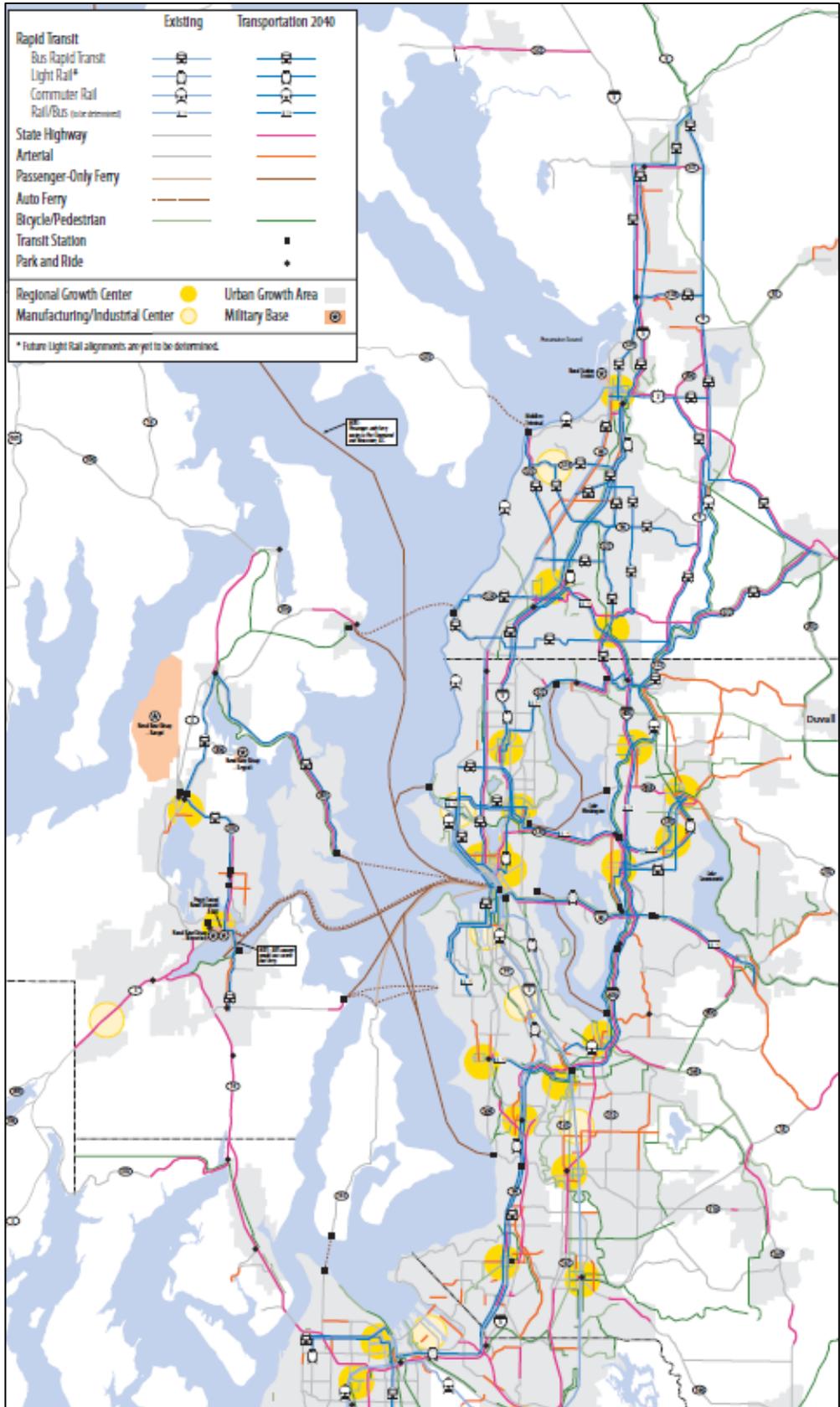
Résumés – Key agency personnel and consultants résumés are included in Appendix G)

Primary Point of Contact - Brittany Esdaile, Regional Next Gen ORCA Program Manager, Work: 206.370.5553 Mobile: 872.267.2202 Email Brittany.Esdaile@soundtransit.org

APPENDIX A: Map of the Central Puget Sound Region (and Transportation System)



Puget Sound Metropolitan Transportation System Map - Transportation 2040



APPENDIX B: ORCA Quick Reference Guide

Next Generation ORCA Basics

ACCOUNT-BASED SYSTEM

The current ORCA system is card-based. The ORCA card is the primary information storage with only a copy stored centrally. When an ORCA card is tapped, the device reads the card and validates the pass or writes the decremented E-purse balance to the card.

An account-based system centralizes most of the logic at the backend of the system, and the card no longer stores product info. Devices validate the account identifier from the card and pass (encrypted) info to the backend, where transaction value is calculated and recorded with no changes to the card.

Benefits of account-based include faster times for product loads to customer accounts (seconds), easier changes to fares, the ability for other vendors to supply equipment, and more flexibility for future expansion. Compatible student and employee ID cards can also be tied to accounts.

A drawback of account-based is the requirement for vehicles and stations to have real-time communication. When a connection is not available, transactions are stored and sent when a connection becomes available, introducing a potential liability for granting a free ride to customers with invalid media before the system hotlists them.



OPEN ARCHITECTURE

In open architecture, the design of the system adheres to published standards. Open APIs (application programming interfaces) may be used as integration tools between system elements. In a true open architecture, there are no licenses required to use these standards and components can be changed or replaced independently with minimal impact on the rest of the system.



OPEN / CLOSED PAYMENT



Open (loop) payment is "Bring Your Own Media" where customers can use bank-issued contactless credit cards or devices with NFC (Near Field Communication) to pay directly from an account. GPR (General Purpose Reloadable) are co-branded open loop debit cards that can be used anywhere.

Closed (loop) payment is media issued by agencies "closed" to use on transit only, and can be reloaded at a retailer, device, or online. In account-based systems, gift card networks can load E-purse value on closed loop cards.



REAL-TIME COMMUNICATIONS

Account-based systems allow fares to be calculated using more sophisticated rules (capping, passes, transfers, etc.) than can be housed in onboard systems and don't rely on driver operations.

To validate that an account has sufficient balance, there needs to be fast communications from the vehicle to the central backend.

Communications may not be always available, so the system stores and forwards transactions when the channel becomes active again.



FARES AND DISCOUNT STRATEGIES

Fare capping is an alternative to offering monthly or daily passes. Customers ride transit and pay per trip, but once a pre-defined cap is reached, the remainder of their trips are "free" to the customer. Caps are variable based on the cost of the transit service.

The industry is trending towards fare capping, as it provides a "best fare" calculation not possible using static fare tables.





**Amended and Restated Interlocal Cooperation Agreement
for Design, Implementation, Operation and Maintenance
of the Regional Fare Coordination System**

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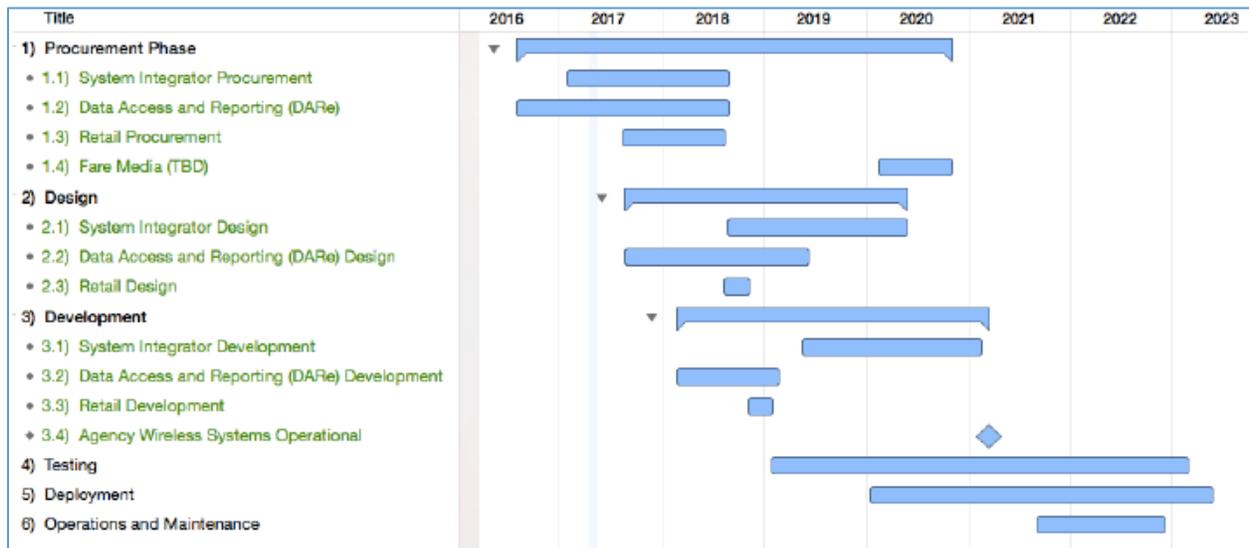
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APPENDIX D: Summary of Metro Outreach Programs Involving ORCA Distribution

| Program | Purpose |
|---------------------------------|--|
| Outreach site visits | Provide Regional Reduced Fare ORCA cards to senior/disabled riders, provide information at employment sites |
| In Motion programs | Provide transit information and incentives, including ORCA cards with value or voucher, to residents of target neighborhoods |
| WSDOT partnership | Offer loaded ORCA cards to promote transit ridership as alternative to SR-520 tolls and Alaskan Way Viaduct construction |
| Southeast Connector campaign | Campaign in southeast King County to inform local residents about bus service improvements and promote the ORCA card |
| Expansion of the retail network | ORCA retailers include: Safeway, QFC, Food Market, Thriftway, Roger's Market Place and Saar's Market Place grocery stores, Bartell Drugs |
| Third-party promotions | Partnerships with TransManage (downtown Bellevue), the City of Redmond, Commute Seattle (downtown Seattle) and the City of Kirkland (GreenTrips) to sponsor programs about travel options and sold ORCA Passport and Business Choice passes to employers |

APPENDIX E: Overview System Integrator Project Timeline

The grant funding would be applied to software development and system integration, to be mainly completed by the System Integrator contractor. The System Integrator contract is scheduled to be awarded in 3Q 2018. If this grant request is awarded, drawdowns on grant funding are anticipated to begin in 4Q 2018 based on key milestone dates of the System Integrator.



The System Integrator procurement Request for Proposal (scope in this grant request) will deliver the following items:

1. Field Devices including On-board and wayside validators, Driver display units, Customer service terminals and Vending machines.
2. Externally Sourced Applications including Customer mobile application, Agency mobile applications, Customer website, and Business Account website.
3. Back-office Systems including Account-based transaction processor, Customer Relationship Management application,
4. Interactive Voice Response system, System Management system, Fare Media Management Application, Financial Management Application, Central Payment Application, Configuration and Change Management Application, Asset Incident Management Application and Tariff Management Application.
5. Fare Media including fare media for initial rollout. In addition to supplying these components, the System Integrator will be contracted to operate the System.

Separate from the RFP, the seven partner agencies will be responsible for wayside and on-board network and mobile devices for Agency mobile validation and inspection applications

The following components of the System will be provided by separately contracted vendors and will not be a part of this procurement: Data Access and Reporting (DARe) system; Cellular service; Merchant bank services; Retail sales network and Fare media beyond initial rollout.

APPENDIX F: Key Personnel Roles and Responsibilities

| Role | Responsibilities |
|--------------------------------|--|
| ORCA Joint Board (JB) | <ul style="list-style-type: none"> • As executive sponsors, champion the Next Gen ORCA within their agencies and governing boards • Approve budget modifications above the authority given to the Steering Committee • Adopt strategic direction of Next Gen ORCA Program • Address program issues escalated by the ORCA Steering Committee |
| ORCA Steering Committee | <ul style="list-style-type: none"> • Advocate Next Gen ORCA as a high priority within their agency and champion the common vision • Provide general oversight for the Project Team • Provide strategic leadership for the program making appropriate scope and schedule decisions within the budget authority delegated by the ORCA Joint Board • Inform ORCA Joint Board of significant scope, costs, schedule, and technology choices • Advise/provide direction to the Regional Program Manager on program processes and org structure • Resolve program issues and interagency conflicts • Prioritize tasks and resolve resource allocation issues based on program prioritization • Address escalated contractor performance issues • Communicate Steering Committee decisions and actions within their organizations • Resolve resource constraints within their agency |
| Regional Program Manager (RPM) | <ul style="list-style-type: none"> • Successfully deliver a system that balances regional and individual agency needs • Manage program scope, schedule, budget, risks and program communication • Provide oversight of all Next Gen ORCA contracts and procurements • Manage Consultant Team and Vendor performance • Lead the Regional Program Team through the full lifecycle of delivering Next Gen ORCA • Maintain effective communications/coordination with program stakeholders and ORCA Steering Committee • Maintain oversight of agency implementation activities and dependent projects. • Coordinate with ORCA Regional Program Administrator on Steering Committee agendas/Joint Board briefings • Act as program liaison to outside entities and serve as an escalation contact to Project Team, Consultants, Vendors, Site Managers, Contracting and Legal Support and SMEs (where applicable) • Coordinate with agencies on upcoming meetings and anticipated resources required |

| Role | Responsibilities |
|---|--|
| Regional Program Team (RPT) | <ul style="list-style-type: none"> • Collaborate with other Regional Program Team Leads, Consultant Team and Vendors to achieve objectives • Represent the diverse needs of the entire region and be resources for the Consultant Team and vendors • Serve as technical and business leads for strategic direction of Next Gen ORCA program • Work as a team to drive nimble day-to-day project decisions and help to keep Next Gen ORCA on schedule • Provide a lead role in consolidating agency input for functional and technical requirements, design review, testing and deployment, planning, and coordination in support of consultant and vendor deliverables • Support development, review and approval of consultant deliverables • Work collaboratively with Agency reps to develop understanding of business/technical environments • Manage the capture, analysis, and documentation of information provided by ORCA agency SMEs • Work with ORCA agency SMEs and assist agencies w implementation planning & business process changes • Participate in ORCA Steering and other Next Gen ORCA Committee meetings as discipline leads |
| Site Managers (SM) or Designated Agency Leads | <ul style="list-style-type: none"> • Point of coordination for their agency’s business requirements and technical constraints • Coordinate agency review of program deliverables and present a consolidated agency view • Coordinate participation and support from Agency SMEs and other agency resources; identify and communicate resource constraints to the Agency Steering Committee member; • Funnel any issues to the Regional Program Manager • Validate that the design meets the stated Agency business requirements at key points in the program • Coordinate agency level testing, training, implementation, operations, and maintenance of Next Gen ORCA • Support the transition from ORCA to Next Gen ORCA |
| Agency Subject Matter Experts (SMEs) | <ul style="list-style-type: none"> • Provide discipline expertise and collaborate with Project Team to define requirements and envision solutions • Coordinate with Agency Site Manager or Designated Lead regarding participation in Next Gen ORCA • Review documents and meet deadlines required for design, review and implementation • Support the Project Team for business requirement and technical constraint clarification, solution alternatives analysis and issue resolution, use case and test case development • Test design and implementation as needed |

| Role | Responsibilities |
|------------------------------------|---|
| ORCA Regional Program Admin. (RPA) | <ul style="list-style-type: none"> • Act as liaison to the Joint Board, Steering Committee, and to the Site Manager group • Provide regional ORCA customer outreach, marketing, legal, and public information resources • Coordinate Fiscal Agent and Security Officer support of the program • Coordinate with existing ORCA vendor and Support the transition from ORCA to Next Gen ORCA • Maintain rosters of Site Managers, Project Team, Steering Committee and Joint Board members |
| Contracting & Legal (ST) | <ul style="list-style-type: none"> • Manage regional procurement and contracting processes as requested by the Regional Program Manager • Provide legal services, including drafting Terms and Conditions, Service Level Agreements (between the agencies and with the vendors), exhibits to the ILA and advising the Reg Prog Mgr and Steering Committee |
| QA Consultant | <ul style="list-style-type: none"> • Provide outside review to assure the adherence to scope, schedule and budget is being properly monitored • Advise the Regional Program Manager and Steering Committee of issues and risks; • Ensure that program requirements are being met |
| Consultant Team | <ul style="list-style-type: none"> • Advise on fare collection industry and regulatory issues and provide a lead role in delivering: <ul style="list-style-type: none"> ○ Systems Engineering documents to meet requirements set forth by the FTA ○ Project Planning documents, including maintaining schedule and Work Breakdown Structure (WBS) ○ Concept of Operations and High-Level System Design ○ Business, Technical and Integration Requirements; RFI process and Peer Review ○ Alternatives Analysis; Solution Design and Transition Strategy ○ Systems integration documents and specifications for function-based APIs ○ Scope of Work for vendor RFPs; Requirements Traceability Matrices • Support Request for Proposal (RFP) evaluation processes; Support testing, verification and implementation • Review vendor deliverables and advise on systems integration; Support O&M phase as needed |
| Vendor(s) | <ul style="list-style-type: none"> • Provide software, hardware, and services solutions • Provide systems integration support as specified |

APPENDIX G: Résumés

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