

# Evaluation Strategy

## Puget Sound Regional Fare Card: FY01 Earmark Evaluation



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## TABLE OF CONTENTS

	<u>Page</u>
Section 1: Introduction and Background .....	1
Section 2: Objectives of the Evaluation.....	6
Section 3: RFC System Description .....	8
3.1 Project Background and Overview .....	8
3.2 Project Goals and Objectives .....	10
3.2.1. Safety and Security .....	11
3.2.2. Efficiency.....	11
3.2.3. Environmental Conservation .....	12
3.2.4. Mobility and Convenience .....	12
3.2.5. Economic Vitality and Productivity.....	13
Section 4: Evaluation Approach .....	14
4.1 The Evaluation Process .....	14
4.2 Analysis of Project History: Historical Timeline of Major Events.....	14
4.3 Analysis of Institutional Issues / Lessons Learned .....	15
4.4 Data Collection Methods .....	18
4.5 Example of Evaluation Strategy Approach: Organizational Culture.....	20
4.5.1 The Organizational Culture Evaluation Category.....	21
4.5.2 Data Collection Activities .....	21
4.5.3 Data Analysis .....	22
4.5.4 Types of Conclusions from the Analysis .....	22
Section 5: Evaluation Management .....	24
5.1 Evaluation Schedule and Deliverables.....	24
5.2 Organization and Responsibilities of the National Evaluation Team.....	25
5.3 Work Breakdown Structure and Level of Effort.....	25

## LIST OF FIGURES

	<u>Page</u>
Figure 1. Map of Central Puget Sound .....	2
Figure 2. Number and percent of persons 16 years and older who work outside of the home and use public transportation to travel to work, by County and year (1990 and 2000).....	4
Figure 4. RFC Centralized Operating Concept Overview .....	9
Figure 5. Mockup of an On-Board RFC Reader .....	10
Figure 6. Overall Evaluation Process.....	15
Figure 7. Evaluation Schedule and Deliverables .....	24
Figure 8. RFC Evaluation Management Structure.....	25

## LIST OF TABLES

	<u>Page</u>
Table 1. Population and Land Area for the Puget Sound Region.....	1
Table 2. Regular and Paratransit Bus Fleets by Partner Agency.....	3
Table 3. RFC Project Sources of Funds (\$Millions).....	5
Table 4. Overview of Institutional Issues / Lessons Learned Analysis Framework.....	17
Table 5. Preliminary Evaluation Categories and Institutional Issues .....	19
Table 6. Work Breakdown and Estimated Level of Effort .....	26

## Section 1: Introduction and Background

King County Metro Transit is the lead agency responsible for implementing the Central Puget Sound Regional Fare Coordination Project (RFC Project). The project features a smart card technology that will support and link the fare collection systems of the major transit agencies operating in the Puget Sound region. The RFC Project will consolidate literally hundreds of existing fare media in an effort to streamline the management of fare transactions and facilitate the cross-jurisdictional and multi-modal trip making of travelers in the Puget Sound region. All seven public transit agencies in the Central Puget Sound area are participating in the project, and on April 29, 2003 each of these agencies signed agreements to participate. These are:

- King County Metro Transit, lead agency
- Community Transit
- Everett Transit
- Kitsap Transit
- Pierce Transit
- Sound Transit
- Washington State Ferries

Figure 1 presents a map of the Puget Sound region served by these seven public transportation agencies. The map shows the major urban centers in the four counties that comprise the jurisdiction of the Puget Sound Regional Council of Governments, which is the Metropolitan Planning Organization for the region. It also shows the major rail and freeway links connecting Everett in the north, Tacoma in the south, and Seattle and Bellevue in the middle. It also includes the Washington State Ferries terminals that link cities in Kitsap County with the west side of Puget Sound. The region can be further characterized in terms of the size and complexity of current operations and coverage. Integrating a regional fare card system across the large number of transit users and land area constitutes a challenge both for the project Partners to successfully implement the program and for the evaluation team to capture the institutional and organizational processes undertaken, and the issues and challenges faced.

Table 1 indicates the size of the region covered by the RFC Project in terms of population and land area.

**Table 1. Population and Land Area for the Puget Sound Region**

County	Population (2002) <sup>1</sup>	Land Area (Sq. Mi.) <sup>2</sup>
King	1,774,300	2,131 sq. mi.
Kitsap	234,700	393 sq. mi.
Pierce	725,000	1,676 sq. mi.
Snohomish	628,000	2,098 sq. mi.
Region Total:	3,362,000	6,298 sq. mi.

<sup>1</sup>Population Estimate, OFM Forecasting, State of Washington, 6/28/02

<sup>2</sup>Quick Facts about the Central Puget Sound Region, Puget Sound Regional Council.

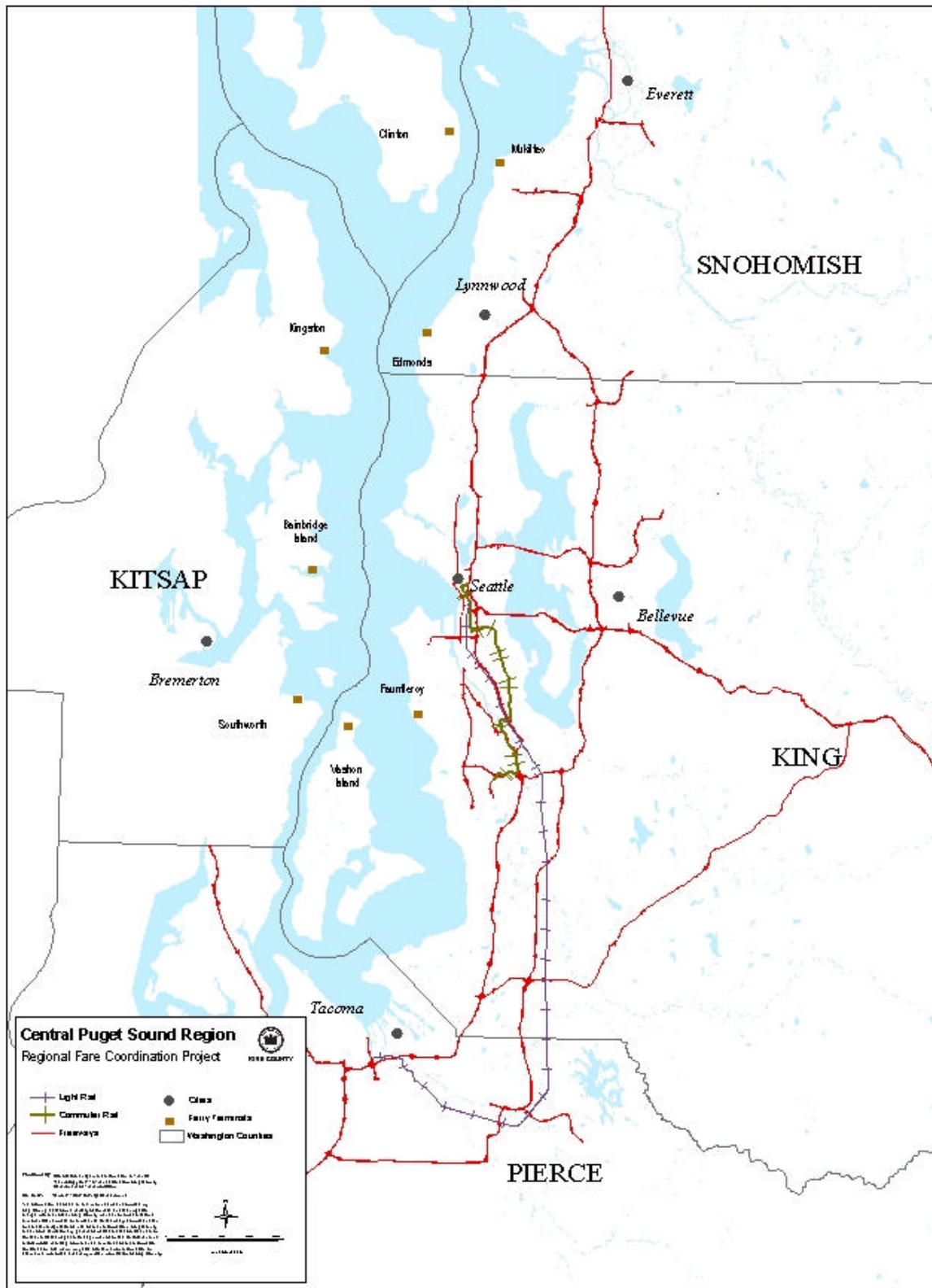


Figure 1. Map of Central Puget Sound

King County Metro Transit serves over half of the region’s population (52.8 percent), while Kitsap Transit serves only 7 percent of the total. King County Metro Transit operates the largest transit fleet in the region and serves the largest customer base of any of the RFC Partners. It also operates an active bus fleet of 1,330 vehicles over 243 routes, with 9,557 bus stops. It served a total ridership of 95,602,341 in 2001, at an operating cost of \$334.5 million. Table 2 shows the number of vehicles in the regular bus fleet of each of six of the seven committed Partner agencies. Note that King County Metro Transit operates almost two-thirds of the regional bus fleet.

**Table 2. Regular Bus Fleets by Partner Agency**

	<b>CT</b>	<b>ET</b>	<b>KCMT</b>	<b>KT</b>	<b>PT</b>	<b>ST</b>	<b>Total</b>
Regular Fleet	276	45	1,330	77	164	194	2,086
Percent	13.2%	2.2%	63.8%	3.7%	7.9%	9.3%	100.0%

CT= Community Transit; ET = Everett Transit; KCMT = King County Metro Transit; KT = Kitsap Transit; PT = Pierce Transit; ST = Sound Transit

Source: Regional Fare Card Project, 4/29/03, *Estimated Agency Equipment Quantities*. Appendix A.

Note: Figures in this table are estimates.

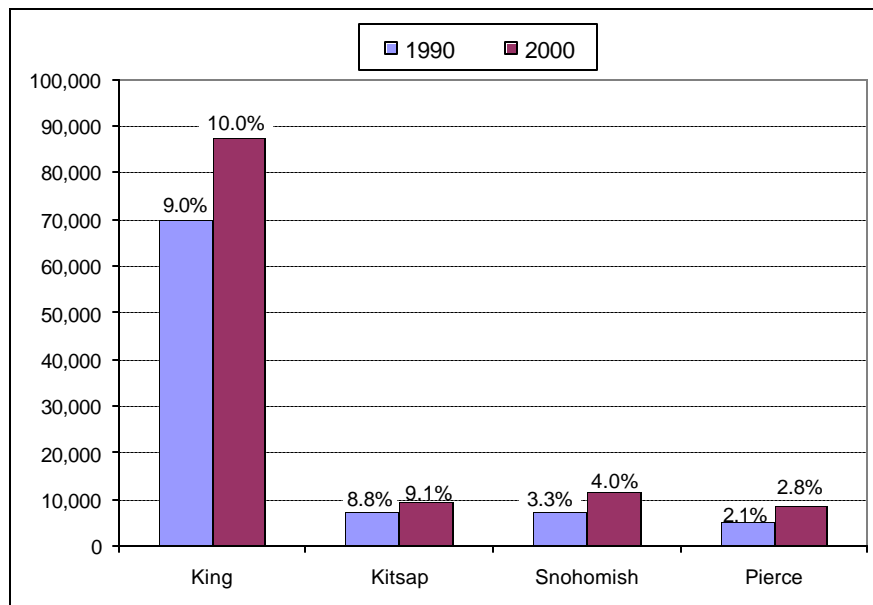
The remaining partner, Washington State Ferries (WSF), does not operate any buses. The WSF system is the largest ferry system in the United States, serving eight counties within the State of Washington and the Province of British Columbia in Canada. Counties served include Pierce, King, Snohomish, Kitsap, Skagit, Island, San Juan, and Jefferson Counties. WSF’s existing system has 10 routes and 20 terminals that are served by 28 vessels. In fiscal year 1999, WSF carried over 11 million vehicles and 26 million people—over one million more walk-on and vehicle passengers and 500,000 more vehicles and drivers than in fiscal year 1997.<sup>1</sup>

Data on travel flows between home and work are compiled under the Census Transportation Planning Package (CTPP), the product of a cooperative program between the State Departments of Transportation, the US Bureau of the Census, and the American Association of State Highway and Transportation Officials (AASHTO). These data provide an opportunity to examine current patterns of public transportation use in the journey to work, cross-jurisdictional flows, and changing socio-economic and travel patterns over time. Figure 2 provides an example of some of these data for the Puget Sound Region in 2000, showing the number and percent of workers who work outside their home within the four counties (King, Kitsap, Snohomish, and Pierce) that comprise the region covered by the RFC Project. In 2000, roughly 10 percent of all King County residents who work outside of their home used public transportation to travel to work, up from 9 percent in 1990.

The limited data presented in this Evaluation Strategy illustrate the important role in the regional transportation system played by King County Metro Transit. It is not surprising then that King County Metro Transit has undertaken a lead role in the design and implementation of the RFC system on behalf of all the Partners. Overall project and contract administration will be the responsibility of a Joint Board, consisting of one representative from each Partner agency. Note that Sound Transit will serve as the Fiscal Agent for the RFC Project. The Fiscal Agent provides

<sup>1</sup> <[http://www.wsdot.wa.gov/ferries/your\\_wsf/index.cfm?fuseaction=our\\_history](http://www.wsdot.wa.gov/ferries/your_wsf/index.cfm?fuseaction=our_history)>, 2003; Regional Fare Card Project, 4/29/03, *Estimated Agency Equipment Quantities*. Appendix A.

a central payment processing and administration function on behalf of the agencies, that supports the regional cost-sharing nature of the financial structure. The Joint Board is responsible for establishing policies and procedures for receiving payments into and authorizing disbursements from the central payments account. Each agency will continue to utilize its own accounting and financial management procedures. Any procedures or policies to be implemented on a regional basis will be developed and agreed jointly by the agencies through the Joint Board.



**Figure 2. Number and percent of persons 16 years and older who work outside of the home and use public transportation to travel to work, by County and year (1990 and 2000).**

The RFC system is one of the few examples of large-scale regional fare card implementation projects. It holds great promise not only to improve the transit travel experience of residents of the Puget Sound region but also to serve as a template for the implementation and operation of a large, complex fare card system for transit agencies across the nation. For these reasons, the RFC Project has been selected by the Federal Transit Administration (FTA) and the United States Department of Transportation (US DOT) Intelligent Transportation System (ITS) Joint Program Office (JPO) for a national evaluation study.

The total capital cost of the RFC Project is estimated at \$42.1 million. This estimate includes all vendor contract cost components including equipment, equipment installation, fare cards, integration, and project management as well as other RFC Project administration costs, including sales tax, contingency fund, and project management team costs. This estimate includes only regionally shared items in the RFC Project capital budget and does not include an estimated \$6.4 million in individual agency implementation costs.

The RFC Project has received, or is expected to receive, funding from federal, local and private sources. Table 3 identifies the RFC Project regional project revenue summary. As shown, FTA Section 5307 funds are meeting \$9.6 million (47.5 percent) of total project costs. Approximately \$4.4 million (21.8 percent) in Section 5288 ITS earmark funding has been identified for the RFC

Project. An appropriation from the Sound Transit Technology Fund is expected to contribute \$3 million (14.9 percent) of project funds. An additional \$2.7 million (13.4 percent) of project funding was obtained from the Congestion Mitigation and Air Quality (CMAQ) Program. Finally, the Boeing Company has agreed to provide a donation of \$500,000 (2.5 percent). Table 3 also shows the local match requirement.

**Table 3. RFC Project Sources of Funds (\$Millions)**

<b>Sources</b>	<b>Amount</b>	<b>Match Requirement</b>
Federal Section 5307	\$9.6	\$2.4
ITS Earmarks 5288	\$4.4	\$0.4
ST Technology Fund	\$3.0	\$4.4
CMAQ	\$2.7	\$0.0
Boeing Donation	\$0.5	\$0.0
<b>Total</b>	<b>\$20.2</b>	<b>\$7.2</b>

This Evaluation Strategy is the first in a series of deliverables to be developed by the evaluation team. Other deliverables, as illustrated later in the schedule (Figure 7), include a formal mid-term progress report, an interim briefing to the COTR and PAWG,<sup>2</sup> digital imagery of the project, periodic progress reports (weekly, monthly, tri-annually), and a draft and final case study evaluation report. The Evaluation Strategy includes the background and the objectives of the evaluation, a description of the RFC system, the evaluation approach, discussion of the proposed evaluation tests, and an evaluation management plan, including estimated level of effort, management structure, schedule and deliverables. Following the acceptance of this Evaluation Strategy, the Battelle team will initiate the evaluation process. This Evaluation Strategy is organized as follows:

- Section 1 – Introduction and Background
- Section 2 – Objectives of the Evaluation
- Section 3 – RFC System Description
- Section 4 – Evaluation Approach
- Section 5 – Evaluation Management

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<sup>2</sup> The Program Assessment Working Group (PAWG) is composed of members of the USDOT agencies and provides oversight and guidance to the JPO’s evaluation programs.



## **Section 2: Objectives of the Evaluation**

The Puget Sound Regional Fare Card program will be evaluated as a case study. The intent is to focus the evaluation on the organizational and institutional processes by which the project Partners face and seek to resolve the challenges that arise as they progress from planning to implementation. The evaluation will provide qualitative information for other transit agencies seeking to implement their own fare card programs to help ensure the success of those implementations. This approach will require a close involvement of the evaluation team in the project to thoroughly understand the project's history and current processes.

The objective of this evaluation is to understand how the Partner agencies work through the process and challenges of identifying and overcoming the institutional, technical, organizational, financial, contractual, and other related hurdles associated with this project. The Partners are faced with implementing a fundamentally new way of doing business among agencies that have both their own long-established legacy systems and procedures, and a desire and willingness to arrive at a common, operable regional fare card system. This evaluation also seeks to identify key, measurable indicators of progress toward meeting these objectives, in terms of changes in procedures, financial advantages, new and improved ways of interacting, new patterns of behavior, and changes in policies and procedures. An overall objective is to gain insights from this earmark that will offer guidance to other agencies considering similar integrated approaches to the implementation of fare card programs.

The original scope of work for this evaluation provided for an expansion of the traditional case study approach by including a provision to identify and collect available secondary data that the partner agencies already collect to supplement our understanding of the impacts and benefits of the RFC project. However, the schedule has shifted to the point that it is now apparent that the evaluation will be completed prior to the beginning of the RFC beta test and project implementation (see the schedule in Figure 7). For this reason, the evaluation will not include quantitative data intended to assess benefits to be derived from the application of a regional fare card system. Nevertheless, to the extent that existing agency data are identified in the course of this evaluation that can help enrich our understanding of the institutional and organizational issues and processes associated with the RFC project, these data will be examined.

A list of objectives for the evaluation of the RFC system was initially identified by the ITS Joint Program Office (as part of the Statement of Work). This list was later reviewed and enhanced by the evaluation team and the RFC Partners in the February 2003 kickoff meeting and in subsequent discussions. The objectives of the evaluation are outlined below.

1. Document the institutional/organizational "history" of the RFC Project: the milestone events, challenges faced and overcome, organizational changes, new institutional structures, new agreements, creative solutions to problems.
2. Assess the processes by which the Partners identify, address and resolve a variety of institutional and policy issues associated with planning for and implementing the RFC Project. Identify the challenges faced and assess the management strategies used to overcome those challenges.

3. Assess how the RFC Project serves to achieve integration among the Partner agencies and through public/private teaming efforts. Assess the evolution in inter-organizational and intra-organizational relationships.
4. Seek to understand which institutional findings are generalizable to other agencies and other settings, and which are unique to the Puget Sound regional context.
5. Assess historical and projected cost data and work with the manager of the FHWA JPO cost database to contribute to current understanding of the cost implications associated with an RFC program.
6. Work with each of the Partner agencies to identify data, other than cost data (covered under Objective 5), that they already collect or could consider collecting that could add to this case study evaluation of institutional and organizational issues and processes.

These evaluation objectives are explored in greater detail in Section 4: Evaluation Approach.

## **Section 3: RFC System Description**

### **3.1 Project Background and Overview**

The Puget Sound RFC system is being implemented in three phases, with the preliminary schedule based on a 39-month system implementation timeframe, as follows:

- Phase I - System Development and Testing
- Phase II - System Build-Out
- Phase III – Revenue Service Operations and Acceptance Testing

System development and testing is scheduled to be conducted from May 2003 through April 2005. Beta testing of system technology is presently slated for early 2005. Following system development and testing, a full system build-out is scheduled for May 2005 through December 2005. Finally, revenue service operations and acceptance testing are scheduled to begin in January 2006 and conclude in July of 2006.

Because this evaluation of the RFC Project will be concluded before the system has been beta tested, it will not be possible to evaluate the Partners' overall success in deploying the system and achieving predetermined revenue, operational, cost, and service objectives. The evaluation, however, will determine how the Partners are addressing the issues associated with their desire to achieve relevant project outcomes, understand the kinds of agreements and decision-making they face, and identify what works well and what doesn't work as well on the road to full implementation of the region-wide system.

Figure 4 shows the RFC centralized operating concept overview. The RFC system will offer several outlets for customers wishing to purchase regional fare cards. Fare cards will be issued and revalued through the project website, at agency customer service offices, by phone, and by mail. Customers may also add value to their card at selected retail outlets, at Sound Transit ticket vending machines, or may automatically revalue periodically based on a predetermined schedule or when the card balance drops below a specified level. Lost, stolen, or damaged cards can be easily replaced without losing value, provided that the customer registers their card with an RFC Partner. For example, when replacing a lost card, the lost card is invalidated and the balance of the original card is transferred to the replacement card.

The RFC system will use contactless microprocessor electronic smart cards to automatically calculate fares due and initiate passenger payments. The Partner agencies expect that following full deployment, the regional fare card and physical cash will serve as the primary forms of fare media within the region. RFC Partners estimate that they will issue 400,000 smart cards upon the commencement of revenue operations.

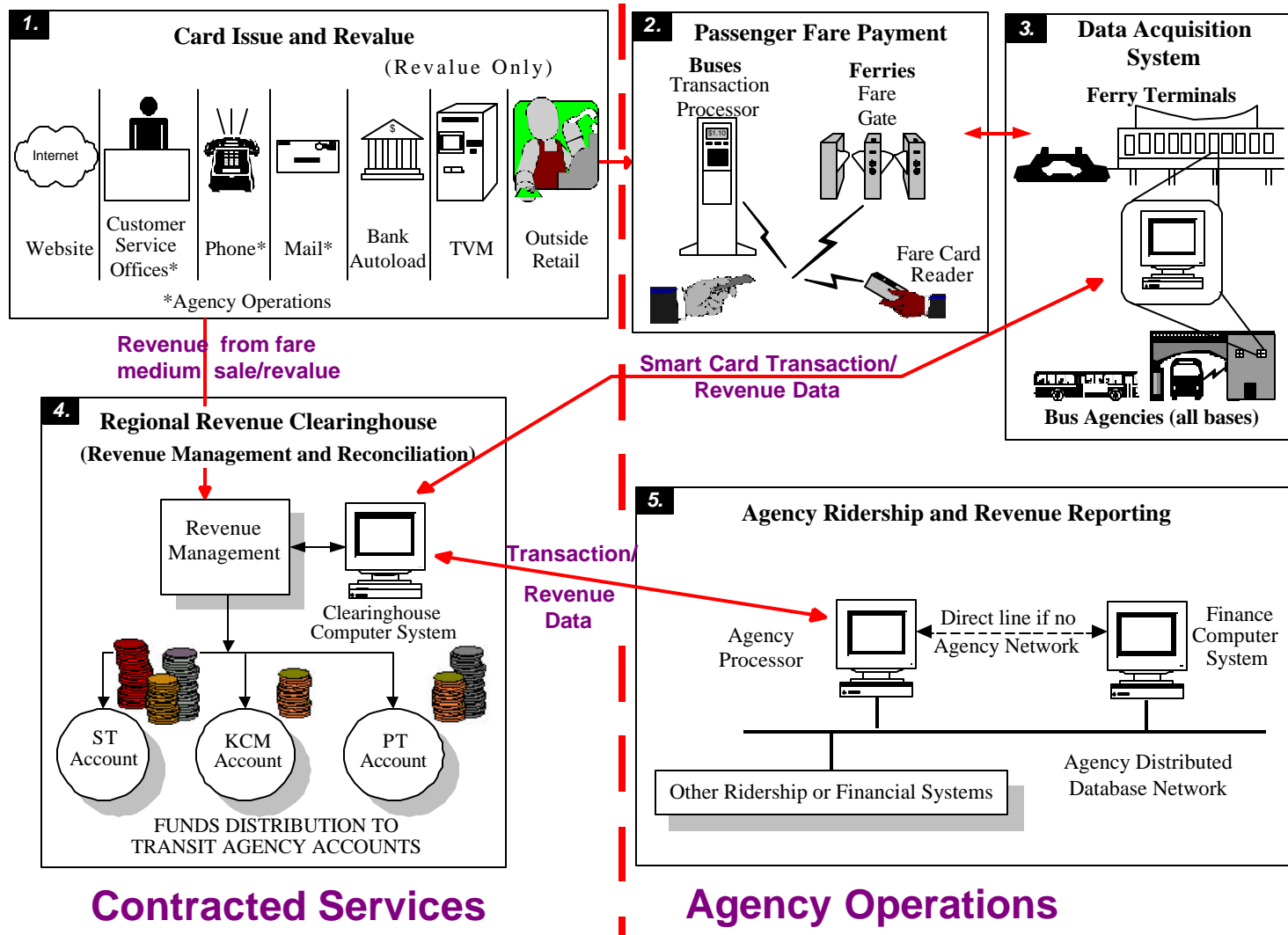


Figure 4. RFC Centralized Operating Concept Overview

Figure 5 shows a prototype of the on-board fare transaction processor (OBFTP) that will be installed on the Partners' bus fleets. This will allow a transit rider to pass his or her card in front of the reader when boarding a transit vehicle, and the fare will automatically be debited from the passenger's card account. Additionally, the unit will allow for storage of transaction information and card revaluation. A similar fare transaction processor is currently in use in the San Francisco Bay Area as part of the TransLink fare card program.

Each time a card is used, data relating to the date and time the card is used, the amount of the fare paid, any incentives applied, the agency, the route, and the institutional account (if appropriate) will be captured and stored electronically. The OBFTP has the capacity to access information on the smart card, process the transaction, communicate the transaction back to the smart card, and transfer data to a data acquisition computer or directly to the regional revenue clearinghouse.

The regional revenue clearinghouse will perform transaction processing, revenue reconciliation, transaction settlement, and financial reporting functions for the RFC system. Settlement transactions will be conducted daily, with settlements reconciled on a three-day processing cycle. As noted previously, a single fare medium will be used but the "back office" nature of the reconciliation process will allow each Partner to maintain a unique fare structure. The clearinghouse is designed to distribute proceeds back to Partner agency accounts and provide revenue and transaction data to agency computers. More detailed and accurate data will assist Partner agencies in financial reporting, establishing business rules, counting passengers, and negotiating contracts with holders of institutional accounts.



**Figure 5. Mockup of an On-Board RFC Reader**

### **3.2 Project Goals and Objectives**

The Central Puget Sound Regional Fare Coordination Project is designed to achieve several key regional objectives. Additionally, RFC Project objectives support and advance the overall goals of the Federal ITS Program, including those relating to safety/security, efficiency, environmental

conservation, mobility/convenience, and economic vitality/productivity. This section details how the RFC Project is expected to support Federal ITS goal areas.

### **3.2.1. Safety and Security**

Safety is an on-going concern of transportation agencies. The new fare card system offers the prospect of reducing bus driver distraction with complex fare systems and non-integrated bus functions. Moreover, travelers using the farecard will not have to carry cash for fares while they travel.

### **3.2.2. Efficiency**

The proliferation of multiple fare and on-board hardware systems reduces operational efficiency and increases costs. For example, there are presently over 300 different types of fare media in use in the region. Furthermore, buses operated by each Partner agency have multiple technological components (e.g., fareboxes and radio systems) that need to be switched on and operational for effective revenue service. Presently, the driver is required to log on to each component separately. Drivers occasionally make mistakes, increasing the time and effort required to log-on. They are sometimes unable to log on properly to some sub-systems, with potential negative impacts on safety and on revenue (i.e., they may use the wrong fare settings if they log on incorrectly).

As part of the RFC Project, a universal driver console is being developed to allow drivers to operate multiple on-board systems from a single device. Using this device, called the Driver Display Unit (DDU), drivers will be able to operate such different on-board systems as the smart card fare collection, the radio system, and the destination sign using a single keypad and display. The DDU will be configured to permit the driver to interact with a single device to log-on/log-off of all connected systems, implement en-route trip changes, and operate on-board systems. The DDU will be configured uniquely for each agency depending on the devices installed in their buses.

The Partner agencies are also using the RFC Project as an opportunity to develop more control over system architecture and the intellectual property underlying their software systems. Provided that the Partner agencies are successful in developing open access systems, they will be able to make future adaptations and changes to their systems at significantly reduced costs.

Perhaps the greatest hurdle to multi-agency fare and service initiatives in the pre-smart card world is the lack of reliable data on which to base business rules (e.g., cost and revenue sharing agreements). Partner agencies have entered into some regional fare initiatives, but to date they have developed business rules based on survey data. The RFC Project will generate actual transactional data that will greatly support the development of such business rules, and thus will help in developing truly integrated regional fare products.

Better transaction data will also help Partner agencies negotiate and monitor more effective contracts with existing organizational accounts. The contracts will be based on actual data and are expected to be easier and quicker to negotiate.

RFC Partner agencies also anticipate a reduction in the costs of manufacturing, processing and distributing fare media. In particular, RFC Partners expect to significantly reduce the administrative costs associated with the monthly distribution and management of fare media for organizational accounts. Rather than distributing fare cards and collecting unused cards for credit, the regional fare card is designed to enable institutional and business account holders to track usage of issued cards, and transfer value from unused cards, underutilized cards, and cards of terminated employees.

### **3.2.3. Environmental Conservation**

Higher ridership resulting from enhanced convenience would take cars off the road, thereby easing congestion, reducing energy use, and reducing auto-related environmental externalities caused by emissions. Furthermore, as the use of existing fare media decreases due to the electronic nature of the smart card application, there will be a reduction in the amount of material used (and wasted at the end of each month) for fare collection.

### **3.2.4. Mobility and Convenience**

It is presently difficult for travelers to plan and carry out trips on the Puget Sound public transportation system if their journey crosses jurisdictional boundaries because each jurisdiction has different fare structures, fare media, and fare collection procedures that are not integrated. The RFC Project will move the region toward a seamless experience for the traveler who will be able to use the same fare card across all agencies and pay for regional transit travel as one package rather than pay individually for separate components of their trip on different systems. There is presently a functioning regional fare product called “Puget Pass”; however, the system still presents impediments that adversely impact ridership and hence have consequences for congestion and mobility in the region’s transportation systems. This evaluation will document the strengths and weaknesses associated with the Puget Pass program, highlighting its important role as a precursor for the current RFC project, and identifying lessons learned from the Puget Pass program.

The RFC system is designed to improve customer satisfaction, particularly among travelers who need to use multiple operators to complete their trips. An objective of the RFC Project is to increase transit ridership retention due to:

- An increase in transit use among people who already have access to smart cards;
- An increase in the number of institutional accounts;
- A more convenient travel experience for travelers taking frequent cross-jurisdictional trips;
- Increased customer satisfaction resulting in transit retaining non-discretionary riders longer; and
- Enhanced casual use of public transportation.

### 3.2.5. Economic Vitality and Productivity

Public transportation agencies are constantly in a state of financial stress. The RFC Project could reduce costs by streamlining various functions, and by reducing some administrative costs. For example, bus drivers are expected to log on faster and more accurately using the integrated on-board systems, thus increasing their operational productivity. Further, use of the contact-less card will lead to a decrease in passenger boarding times and a resultant increase in operative speeds. The smart card application may also offer the potential of creating significant new revenue streams through creative application of the cards for a wide range of transportation and non-transportation uses, though the near-term focus is on providing the fare card for transit use.

The RFC system is also expected to offer several marketing benefits to Partner agencies. A large portion (more than 80 percent) of King County Metro's transit passes are purchased and administered by institutions – corporations and organizations – that in many cases subsidize the value of the transit card for their employees. Private sector businesses employ a variety of mechanisms to encourage and support their employees to use the system, and they work closely with the Partner agencies in promoting public transportation. This is made more difficult by the lack of underlying integration across the system components and by the lack of a single fare card that can serve public transportation needs as well as offering businesses and travelers additional functionality (i.e., the ability to use the card for non-transportation purchases and transactions). The RFC project will help the Partner agencies serve their business client base more effectively in two important ways:

- The RFC Project will significantly reduce the administrative and logistical burden of fare distribution on the organizations operating such programs. Automatic revaluing would replace a periodic (monthly, quarterly or annually) administration of fare cards.
- In many cases, transportation agencies sign customized contracts with organization accounts, contracts that provide the organization with reduced costs for transit products in exchange for other travel policies implemented by the organization (such as restraining a parking benefit). For example, a visitor card has been discussed with the Seattle Convention Bureau that would offer visitors access to both transportation and conventional facilities and functions. Negotiating these kinds of contracts is significantly hampered by the lack of reliable data that can be used to analyze the impact of such a deal on transit use. The RFC Project will supply much of the data the Partner agencies need to develop effective contracts.



## **Section 4: Evaluation Approach**

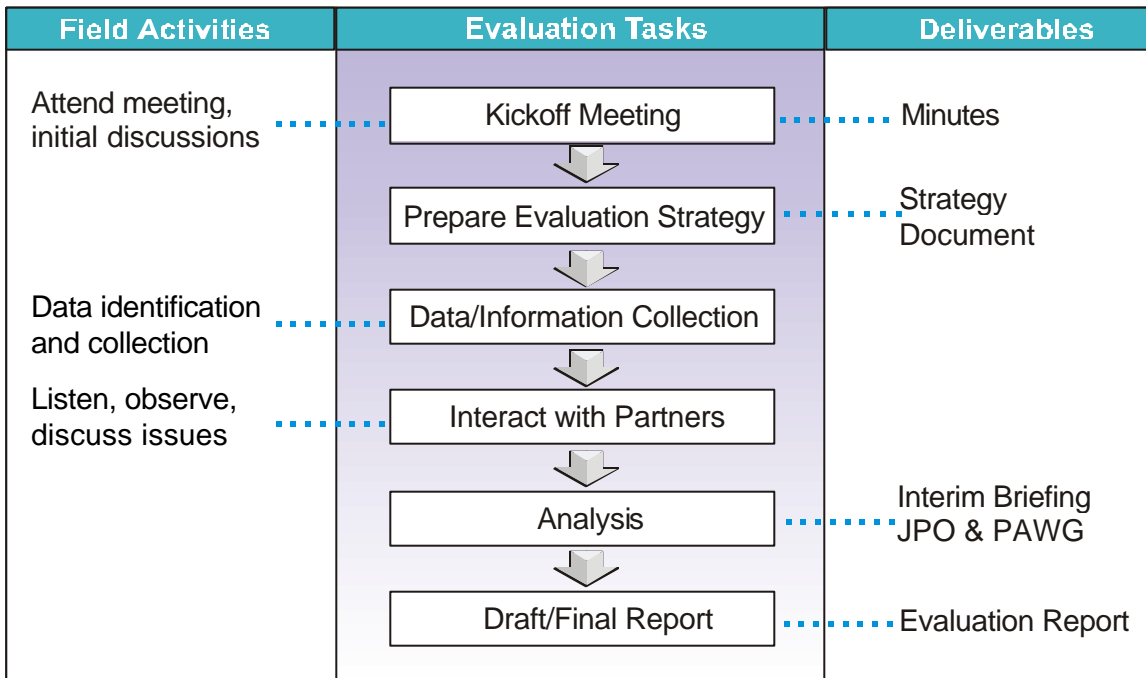
### **4.1 The Evaluation Process**

National ITS evaluations promote understanding of the benefits associated with ITS deployments and document the institutional lessons learned in implementations. In this way, they enhance future ITS deployment efforts and contribute to the National ITS benefits database. In general, there are two kinds of national ITS evaluation: (i) those designed to assess the outcome of program goals and objectives based on hypothesis testing and empirical analysis, for example using before/after data; and (ii) those that focus on the institutional issues and barriers faced by the project Partners, along with the strategies they used to address these issues. Because in the present case the evaluation study timeframe ends prior to full system deployment, this evaluation will take the case study / lessons learned form, and will seek to identify and analyze the institutional issues that the Partners addressed during the various stages of system development.

This section describes the overall approach planned for the evaluation of the Puget Sound RFC system. Figure 6 shows the overall process to be employed. The figure identifies the tasks involved and assigns field activities (e.g., activities that will involve members of the evaluation team contacting local Partners and public officials) and deliverables to each step in the process. The first task, the kickoff meeting, took place on February 12, 2003, and draft minutes were prepared. The present evaluation strategy document is the next project deliverable. Once this strategy has been approved and formalized, data/information collection and analysis will follow. Mid-way in the evaluation process, the evaluation project manager will provide an interim briefing to the ITS Joint Program Office and the Program Assessment Working Group (PAWG). The estimated delivery date for the draft evaluation report is January 2005. Following a formal review process, and after addressing the issues raised by the review panel, a final evaluation report will be delivered. Delivery of the final report is scheduled for March 2005.

### **4.2 Analysis of Project History: Historical Timeline of Major Events**

The evolution and development of the RFC system is an interesting story that should be chronicled for a national audience. Agencies in other areas considering farecard projects will benefit from knowing about the experiences of the Puget Sound region during the RFC project development process. A broader understanding of the sequence of events that occurred during the development of the Puget Sound RFC system will assist project managers and planners in the deployment of future systems. Moreover, a big picture timeline of important project milestones will provide context within which the more detailed analyses of institutional issues can be meaningfully situated. Therefore, part of the evaluation data collection process will be oriented toward identifying the chronology of main events that took place during the development of the Puget Sound RFC system.



**Figure 6. Overall Evaluation Process**

However, it is understood that the establishment of a detailed project chronology is not the primary purpose of this evaluation; rather, the chronology is intended to provide context and a framework for understanding the project development process. Such a framework will be assembled piece by piece over the course of discussions, interviews with RFC personnel, and reviews of project documentation. It is expected to be composed of a sequence of events, accomplishments, and program elements over the RFC system development and implementation process. Elements might include development of the interlocal agreement, determination of system specifications, and the many key decision points along the way dealing with costs, revenues, design, procurement, and the like.

### 4.3 Analysis of Institutional Issues / Lessons Learned

The primary purposes of the evaluation are to identify and collect data and information relating to the institutional issues that arose during the various stages of system development; to determine the strategies employed by project Partners to address these issues; and to document lessons learned that may be applicable to future ITS deployments. The evaluation will identify and convey unique management strategies, key decisions and innovative methods used to overcome institutional challenges confronted during the development of the RFC system. The case study / lessons learned approach will provide qualitative information regarding the overall development of the RFC Project, and will enable the evaluation team to assess the processes by which the project Partners identified, addressed and resolved a variety of institutional and policy issues.

To help structure and organize the data collection and analysis, the range of institutional issues identified during the evaluation will be classified according to a smaller set of major issue

categories. Major institutional issue categories will be defined and, following additional research and the receipt of input from project Partners, finalized. A preliminary list of nine issue categories has been identified from discussions during and following the kickoff meeting:

- Regional context
- Organization structure
- Organizational culture
- Governance and decision-making
- Organizational functions and procedures
- Accounting
- Agency-customer relations
- Agency-vendor relations
- Technology

Table 4 provides an overview of the evaluation approach, including the basic objectives of the evaluation, the institutional issue classification taxonomy (e.g., categories of issues, specific issues and strategies for overcoming issues), data sources, analysis methods, and lessons learned.

**Table 4. Overview of Institutional Issues / Lessons Learned Analysis Framework**

Objectives	Classification Scheme	Data Sources	Method of Analysis	Lessons Learned
<p>-Document the institutional/organizational “history” of the RFC Project</p> <p>-Assess processes by which Partners identify, address and resolve institutional and policy issues</p> <p>-Assess how the RFC Project facilitates regional coordination and public/private partnerships</p> <p>-Seek to understand which institutional findings may be generalized to other agencies / other settings</p> <p>-Assess historical and projected cost data</p> <p>-Identify data that are already collected to supplement an understanding of institutional and organizational issues and processes</p>	<p>Categories of issues:</p> <ul style="list-style-type: none"> <li>-organizational culture</li> <li>-governance</li> <li>-other organizational functions and procedures</li> <li>-accounting</li> <li>-customer relations</li> <li>-agency-vendor relations</li> <li>-RFC technology</li> </ul> <p>Issues within the categories:</p> <ul style="list-style-type: none"> <li>-Issues that are faced by the partner agencies and identified in the evaluation</li> </ul> <p>Strategies:</p> <ul style="list-style-type: none"> <li>-Strategies used to resolve policy and institutional issues</li> </ul>	<p>RFC Project documents:</p> <ul style="list-style-type: none"> <li>-System procurement services and equipment specifications</li> <li>-Interlocal cooperation agreement</li> <li>-Vendor contract</li> <li>-Fare reconciliation agreement</li> </ul> <p>Technical literature:</p> <ul style="list-style-type: none"> <li>-“Smart card” technology articles</li> <li>-Regional fare card deployment case studies</li> <li>-ITS institutional issue / lessons learned studies</li> <li>-Electronic fare deployment and fare integration reports</li> </ul> <p>Personal interviews:</p> <ul style="list-style-type: none"> <li>-Interviews with agency staff, public officials and private sector participants</li> <li>-Interviews will be guided by a structured, written protocol</li> </ul> <p>Other sources:</p> <ul style="list-style-type: none"> <li>-Focus groups</li> <li>-Surveys</li> <li>-Attendance at key partnership and agency meetings</li> </ul>	<p>Qualitative analysis of information gathered from the data sources:</p> <ul style="list-style-type: none"> <li>-Identify/organize/classify issues/challenges faced by Partner agencies</li> <li>-Content analysis of documents using the classification scheme as a guide</li> <li>-Conduct of interviews and other data collection approaches to gather qualitative data from respondents</li> <li>-Mapping the institutional layout of the RFC system: What agencies and organizations should be included? Who are the key individuals? What are the lines of connection? What are the organizational roles and responsibilities?</li> <li>-Identify and assess the measures or strategies taken to address the issues (procedures, agreements, decisions, policies).</li> <li>-Collect/analyse available, relevant secondary data</li> </ul>	<p>Lessons learned that may apply to current and future ITS deployments</p> <ul style="list-style-type: none"> <li>-Policy guidelines</li> <li>-Strategies for anticipating, addressing and mitigating barriers</li> <li>-Contextual factors that influence outcomes</li> <li>-Stepwise approach to help avoid problems</li> <li>-Sources of useful information</li> </ul>

Within each broad issue category, specific key issues will be identified and analyzed. For example, under the accounting category, several issues have tentatively been identified, including cost allocation, revenue allocation, fare structures, agency funding, and transition from old to new transaction-based procedures. During and following the data/information collection process, the list of issues will be refined, each issue will be analyzed and the mitigation strategy employed by project Partners will be identified and assessed to determine its success. Finally, the lessons learned by the project Partners and the evaluators will be documented.

Table 5 provides a preliminary listing of key issues within each issue category. The listing was derived from initial discussions with the RFC Partners and from a survey of prominent institutional issues associated with the U.S. DOT's ITS program and compiled under the "What Have We Learned Initiative" conducted in early 2000.

As the RFC program evaluation proceeds, the knowledge and understanding of institutional issues gained will lead to the refinement of the issues and issue categories provided in Table 5. As the taxonomy of institutional issues is further specified and clarified, it will serve as a working outline of the challenges confronting efforts to introduce and implement a regional fare card program in Puget Sound, and will offer guidance to other agencies considering a similar program.

#### **4.4 Data Collection Methods**

To develop an understanding of the issues suggested in Table 5, the evaluation team will be collecting both objective and subjective data that will define and describe the issues and their place in the processes of establishing a fare card program. The methods of data collection will include some or all of the following:

- Visits to each of the Partner agencies to observe their operations and discuss the issues from each of their unique perspectives. Such visits will take place several times over the course of the two-year evaluation, and they will provide an opportunity for members of the evaluation team to become well acquainted with the key members of each Partner agency. During these site visits, the evaluation team will seek to identify and describe the issues more fully, collect data that may be helpful, including copies of project documents and other data such as current and projected program costs, information about how the process works now, and expectations about what is likely to change under the RFC program and what the impact of those changes might be.
- In-person interviews with key informants. Persons identified for interviewing will include elected and appointed public sector officials; private sector persons in the business community; and individuals knowledgeable about RFC technical, financial, legal, and other aspects. The questions that will be asked during these interviews will be carefully framed to insure coverage of the issues and the collection of a consistent set of data from all the interviews. This interview format will be drafted in a written protocol.
- Focus group discussions with 6 to 10 persons each may be used in addition to the in-person individual interviews. Focus group discussions are also guided and moderated but allow for more open-ended exploration of the issues of interest to this evaluation.

**Table 5. Preliminary Evaluation Categories and Institutional Issues**

Evaluation Category	RFC Institutional Issues
Organizational culture	<ul style="list-style-type: none"> <li>- Management awareness and acceptance of RFC goals</li> <li>- History and willingness to engage in regional collaboration and sharing</li> <li>- Belief that smart card technology can improve public transportation</li> <li>- Organizational flexibility</li> <li>- Management risk tolerance and perceptions of risk associated with RFC</li> <li>- Organizational values</li> <li>- Short term versus long term perspective on O&amp;M; regional “vision”</li> </ul>
Organizational structure, inter-relationships, partnering, and organizational change	<ul style="list-style-type: none"> <li>- Mapping the organizations that have an interest in the RFC and their existing interactions; roles and responsibilities</li> <li>- Identifying need for or opportunities for new linkages (lines of communication; data sharing; etc.)</li> <li>- New organizations or restructuring of existing organizations in response to RFC (organizational change)</li> <li>- Public/private organizational relationships; definitions of “partnership”; trust</li> <li>- Network communication and protocols</li> <li>- Impact of Puget Pass system on evolution of RFC Project</li> </ul>
Regional context	<ul style="list-style-type: none"> <li>- Factors likely to influence RFC outcomes include: land use, settlement patterns, travel patterns (especially cross-jurisdictional transit travel), growth patterns</li> </ul>
Governance and decision making	<ul style="list-style-type: none"> <li>- What decisions are relevant to RFC?</li> <li>- Who participates in decision making?</li> <li>- At what level in organizations are decisions made?</li> <li>- Decision rules (majority? consensus?)</li> <li>- Position and influence</li> <li>- Time frame of project</li> <li>- Liability and risk</li> <li>- Role of unions</li> <li>- Extent of support from elected and appointed officials (political environment)</li> <li>- Agency and government regulations and requirements</li> <li>- Data ownership and sharing agreements</li> <li>- Procedures for withdrawing from the RFC system</li> </ul>
Other organizational functions and procedures	<ul style="list-style-type: none"> <li>- Procurement, staffing, training, and planning</li> </ul>
Accounting	<ul style="list-style-type: none"> <li>- Costs (capital and operations)</li> <li>- Revenue distribution</li> <li>- Fare structures</li> <li>- Revenue reconciliation</li> <li>- Agency funding structures</li> <li>- Transition from old to new transaction-based procedures</li> </ul>
Agency-customer relations	<ul style="list-style-type: none"> <li>- Marketing the RFC; uncertainty regarding the future market for fare cards</li> <li>- Public perceptions of transit and electronic fare cards</li> <li>- Role of businesses; relationship between Partners and business community</li> <li>- Privacy</li> </ul>
Agency-vendor relations	<ul style="list-style-type: none"> <li>- Negotiation to agreement/contract</li> <li>- Control and responsibilities</li> <li>- IPR</li> </ul>
RFC technology	<ul style="list-style-type: none"> <li>- System architecture and standards</li> <li>- Impact of new technology on operations and organizational structure/function</li> <li>- Integration of RFC with legacy systems</li> </ul>

- More structured surveys may be used to efficiently collect data from a larger number of respondents. They can take the form of written questions or interviews conducted by phone or even over the Internet.
- Attendance at key partnership and agency meetings. Participation as observers in these meetings will provide a first hand opportunity to hear the policy discussions, issue debates, and decisions made in order to better understand the nuances in the policy and institutional process as it unfolds.
- The evaluation team has already received a number of important policy and procedures documents from the RFC Project. These document key agreements reached among the participants. They include procurement plans, contracts with vendors, and an Inter-local Agreement hammered out over several years among the Partners that defines how they will work together, make critical decisions, handle the risks of the project, and govern their activities. These will be systematically reviewed to identify and understand the procedures, experiences, and issues that characterize the the development of the fare card program.
- The Battelle team has already begun to identify the available literature on other efforts around the country to develop electronic or smart card transit fare programs. The differences and similarities between these programs and the Puget Sound RFC Project will be examined and evaluated to further clarify the nature of the issues that are specific to this Puget Sound RFC Project and are more generally applicable to smart card programs anywhere.

As part of the general approach to discussions and interviews during data collection activities, some time will be devoted to establishing and reviewing basic information related to the project timeline. Some respondents may be more comfortable discussing such factual material than abstract topics such as institutional issues. Nonetheless, it is likely that even these discussions will provide useful insight into institutional issues.

#### **4.5 Example of Evaluation Strategy Approach: Organizational Culture**

To demonstrate the approach that we have described above for conducting the RFC evaluation, we discuss here, as an illustrative example, how the approach would be applied to examine and analyze a particular evaluation category: organizational culture. The discussion below presents:

- a general explanation of what we mean by the organizational culture evaluation category, together with some examples of evaluation issues that we expect to examine as part of the evaluation activities;
- a brief discussion of how we plan to collect data relevant to this evaluation category;
- an explanation of how we intend to analyze the data that will be collected; and
- an indication of the types of conclusions that we expect to draw from the analysis.

Of course, each evaluation category will likely have specific aspects that require customized treatment, so the discussion here should not be taken as a detailed description of how the evaluation will be carried out for all categories.

### **4.5.1 The Organizational Culture Evaluation Category**

The different Partner agencies involved in the RFC Project are very diverse with respect to a number of characteristics that, together, contribute to and define each agency's organizational culture. These differences in organizational culture among the Partner agencies translate into differing views of the RFC project's potential to them. Addressing and reconciling these differences were challenges that had to be met and resolved during RFC project development.

Our selection of organizational culture as an evaluation category reflects the importance of understanding the nature of these differences between the Partner transit properties, and of identifying successful strategies for reconciling them during the process of project development.

Following are some of the significant organizational characteristics that were identified in kickoff meeting discussions as being important aspects or determinants of the organizational culture of RFC Project Partner agencies, and important sources of differing perceptions about the project between them:

- size of operation;
- type of ridership and services;
- available financial resources;
- procurement and other administrative processes;
- business plan and marketing focus;
- level of in-house technical capabilities;
- level of management comfort with technology; and
- overall degree of risk aversion.

There are, of course, strong inter-relations between some of these. These characteristics are examples of potential issues that will be clarified and refined in the evaluation effort.

### **4.5.2 Data Collection Activities**

The general approach that we will follow to collect evaluation data has been described above. A portion of our standard data collection approach will be tailored to obtain information needed for the analysis of the organizational culture evaluation category. We do not currently anticipate that data collection for analysis work on this evaluation category will require additional measures or efforts outside of the standard approach.

A large part of the data collection will be accomplished through structured interviews with personnel in each of the RFC Partner agencies. The interviews will involve a set of standard questions tailored to personnel at different levels and positions in their respective agencies. We will design the question set to elicit information from interviewees regarding the various organizational characteristics (potential issues) identified above, and to ascertain how these characteristics influenced the participation of their agency at different points in the RFC project development process. However, there will also be sufficient flexibility in the interview process and format to allow the exploration of any new and unanticipated material that may be raised



during the discussions. This flexibility is necessary to allow for the possible discovery of new evaluation categories and/or issues.

As mentioned above, some of the standard questions will focus on establishing the project timeline and documenting key events and decisions that occurred. This is of course necessary to obtain the information needed to develop a complete project timeline. In addition, this approach has the advantage of concentrating on definite facts that the interviewees are familiar and comfortable with. It is likely, however, that such discussions will also provide information leading to a better understanding of the (perhaps more intangible) institutional issues that are key to the evaluation.

Additional data collection will take place through compilation of available (published or internally-maintained) statistics on Partner agency characteristics and operations, as well as other relevant data from external sources.

### **4.5.3 Data Analysis**

Our analysis of the collected data will involve coalescing the information obtained from the interviews and other sources into a set of key conclusions about relationships between agencies' organizational characteristics and their participation in the RFC project development process. This will basically involve a two-step process:

- identifying the important evaluation issues in the organizational culture evaluation category; and
- for each identified issue, elucidating the relationships between, on the one hand, agencies' characteristics related to the issue and, on the other, agencies' attitudes towards and participation in the RFC project development activity.

The two steps are not completely independent because a detailed examination of agency characteristics and participation in the process may well suggest additional issues that can be used to organize the information gathered and the lessons learned. An additional perspective will involve assessing how the local context factors in to determining project outcomes.

Our objectives in pursuing the analysis will be both to identify the significant organizational culture issues as well as to arrive at a sound understanding of how these issues affected agencies' involvement with the RFC Project throughout its development.

### **4.5.4 Types of Conclusions from the Analysis**

We expect that the evaluation data analysis will enable us to draw conclusions relating to strategies that enabled differences in the organizational cultures of Partner agencies – differences that resulted in contrasting and potentially incompatible attitudes towards the RFC Project – to be addressed and successfully resolved during the course of project development.

In developing our conclusions, we will be particularly interested in identifying and highlighting resolution strategies that appear to have a wide applicability and that might be useable by other

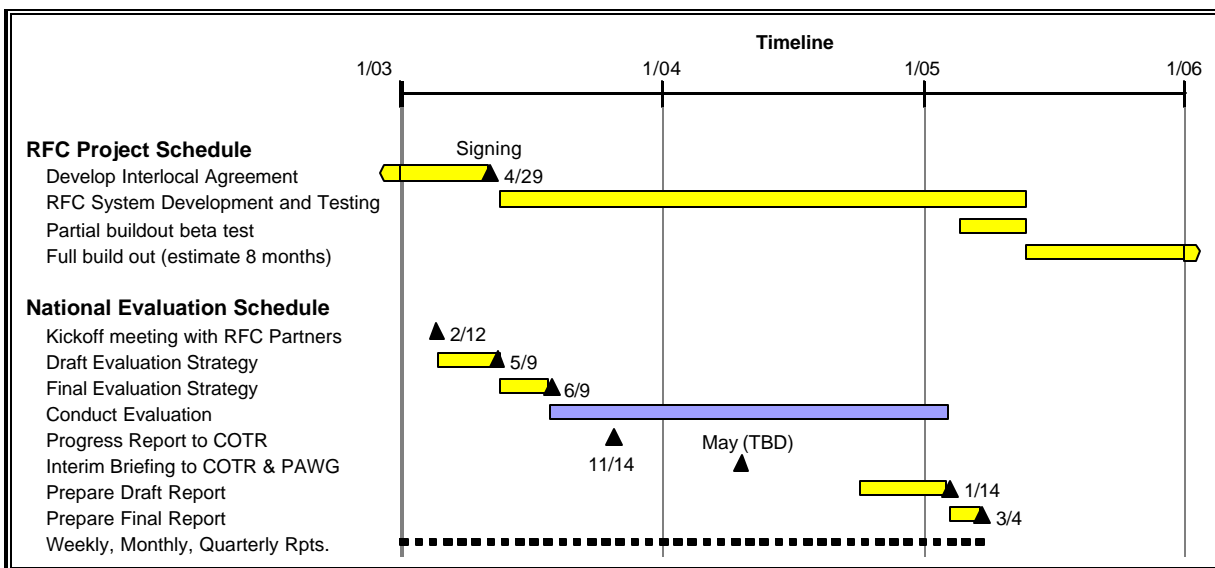
transit agencies considering projects that may involve similar types of inter-agency coordination and integration. However, this will not preclude analyzing and documenting strategies that were significant to the RFC Project but may not be relevant elsewhere. We will also be interested in any strategies that may have been less than fully successful when they were initially applied, and so were subsequently modified or abandoned.

Some of the conclusions reached in the organizational culture analysis will likely overlap with those reached in the analysis of other evaluation categories, such as those relating to project governance, administration and finance.

## Section 5: Evaluation Management

### 5.1 Evaluation Schedule and Deliverables

The evaluation is projected to cover a two year period, beginning with the formal kickoff meeting that was held in Seattle, WA on February 12, 2003 and continuing through the delivery of the final evaluation report on February 18, 2005. After completion of the Evaluation Strategy, the evaluation activities will begin and will parallel the planning and development of the RFC Project by the Partner agencies. The evaluation will end at about the time the Partners initiate their three month beta testing of their project on a portion of the regional public transportation system. The highlights of the project and evaluation schedules are shown in Figure 7.



**Figure 7. Evaluation Schedule and Deliverables**

As shown in Figure 7, the Interlocal Agreement has been completed, and the formal signing ceremony took place on April 29, 2003. Subsequently a formal Notice to Proceed was issued to the system vendor, and the implementation phase of the project was begun. This includes a confirmation process for all the requirements, followed by requirements acceptance about three months after the Notice to Proceed. The software development work will then begin, starting with conceptual design and continuing on to preliminary designs, final designs, and beta readiness testing. At the end of this part of the process will be beta acceptance. After approximately three months of beta testing on a partial build-out of the system, full build-out will begin and last for a projected eight months. At that point, revenue service operations will commence, but the program will undergo another seven months of acceptance testing. Any problems that may arise during the acceptance testing period are likely to further extend the acceptance testing process. However, as shown in Figure 7, the national evaluation is expected to be completed before the implementation phase is finished and even before the beta testing begins.

## 5.2 Organization and Responsibilities of the National Evaluation Team

The evaluation team is lead by the Battelle Memorial Institute, which is under contract with the Federal Highway Administration (FHWA). Dr. Chris Cluett of the Battelle Seattle Research Center is serving as the National Evaluation Project Manager. Battelle is being supported on this evaluation by Charles River Associates and Battelle staff located at the Pacific Northwest National Laboratory (PNNL), as shown in Figure 8. The assembled team provides expertise in several critical elements associated with this evaluation, including policy, finance, economics, institutional arrangements, and transportation systems.

Dr. Cluett has management responsibilities for the evaluation team, and will oversee the day-to-day activities associated with the evaluation of the RFC Project. He will also work closely with counterparts among the RFC Partner agencies, coordinated through Ms. Candace Carlson, the RFC Project Manager, and with the US DOT ITS JPO and the FTA. These links are illustrated in Figure 8.

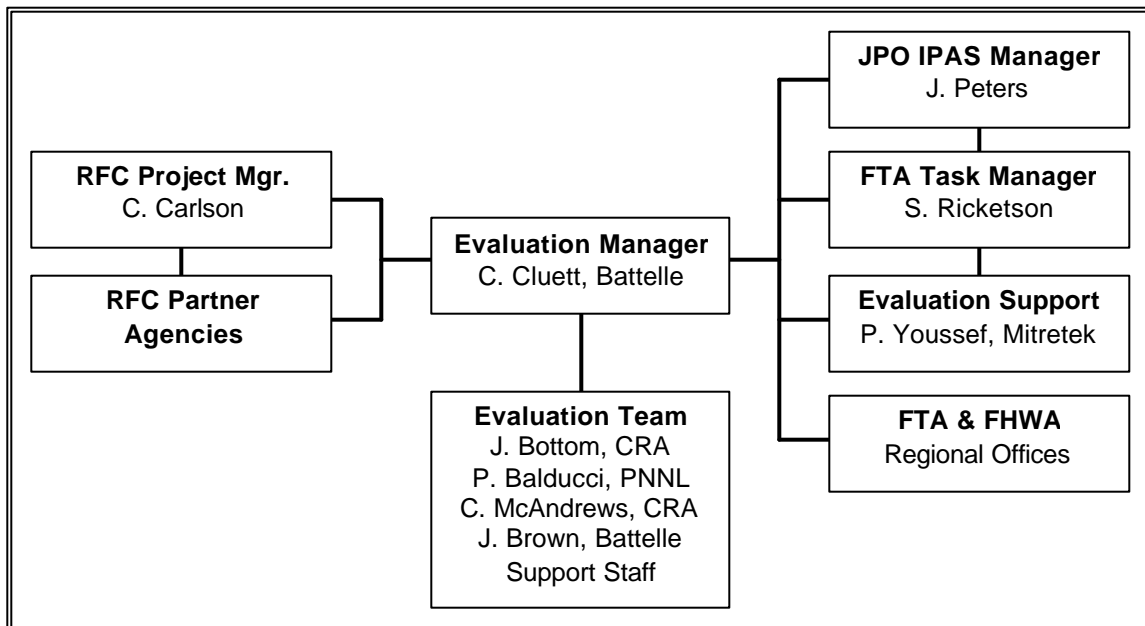


Figure 8. RFC Evaluation Management Structure

## 5.3 Work Breakdown Structure and Level of Effort

Table 6 provides an outline of the work elements and the hours allocated to tasks and members of the evaluation team. The table notes the level of effort planned for each task, and demonstrates that the focus of the evaluation will be on the collection and analysis of information in support of a comprehensive analysis of the institutional issues addressed and strategies employed during the development of the RFC Project. Further, the work allocation demonstrates that the evaluation must be managed in an efficient manner in order to execute the approach outlined in this strategy document given available resources.

**Table 6. Work Breakdown and Estimated Level of Effort**

<b>Task/Subtask</b>	<b>Battelle</b>	<b>CRA</b>	<b>PNNL</b>	<b>Total</b>
<b>Kickoff Meeting</b> <ul style="list-style-type: none"> <li>• Attend meeting</li> <li>• Prepare minutes</li> </ul>	32	34	23	89
<b>Evaluation Strategy</b> <ul style="list-style-type: none"> <li>• Review documents</li> <li>• Meet with RFC Partners</li> <li>• Prepare draft strategy</li> <li>• Prepare final strategy</li> </ul>	74	62	29	149
<b>Identify and Assess Process Issues</b> <ul style="list-style-type: none"> <li>• Prepare for meetings with Partner agencies</li> <li>• Conduct site visits</li> <li>• Understand/describe current RFC system</li> <li>• Attend scheduled RFC Partner meetings</li> <li>• Document procedures</li> <li>• Identify issues/problems/solutions</li> </ul>	212	181	145	538
<b>Collect Data and Information</b> <ul style="list-style-type: none"> <li>• Documents and reports</li> <li>• High resolution photography</li> <li>• Appropriate and available secondary data</li> <li>• General literature on topic</li> </ul>	236	52	82	370
<b>Interim Progress Report to COTR</b> <ul style="list-style-type: none"> <li>• Prepare and submit report</li> </ul>	20	12	12	44
<b>Interim Briefing to COTR and PAWG</b> <ul style="list-style-type: none"> <li>• Prepare briefing</li> <li>• Present briefing</li> </ul>	16	8	12	36
<b>Prepare Evaluation Report</b> <ul style="list-style-type: none"> <li>• Prepare draft report</li> <li>• Prepare final report</li> </ul>	184	48	72	304
<b>Archive Data</b>	20	4	16	40
<b>Project Management</b> <ul style="list-style-type: none"> <li>• Weekly, Monthly, Quarterly Reporting</li> <li>• Administrative/contracts support</li> <li>• Secretarial support</li> </ul>	164	16	0	180
<b>Totals</b>	958	417	375	1,750

Note: Hours include all research and support staff by organization