Operations and Travel Information Integration Sharing (OTIIS) Business Model

A Draft Report

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Executive Summary

The Operation and Travel Information Integration Sharing (OTIIS) Project is an advanced traveler information systems (ATIS) development project for the Interstate 90 (I-90) and Interstate 94 (I-94) corridors, which cross eight states from Washington to Wisconsin, covering nearly 2000 miles. The goal of this project is to promote safety and efficiency on these corridors by providing traveler information services based on conditions and data from the transportation system.

ATIS require significant investments for implementation, ongoing operation, maintenance, marketing, and enhancement to keep pace with new technologies. To make this project sustainable, partner states will have to make ongoing fiscal contributions or identify an alternate way to fund it. If any partners are not able to continue supporting the project due to economic reasons, this project may become vulnerable. Therefore, it is important to identify and evaluate alternate business models for making this project sustainable.

Public sector agencies such as state DOTs, FHWA, public undertakings, and regional coalitions are typically the largest investors in and managers of ATIS infrastructure. Therefore, they play a key role in determining how the ATIS would function, based on their capabilities and resources. ATIS projects have four primary functions: (1) Data Collection; (2) Data Provision/fusion; (3) Information Dissemination; and (4) System Development and Operations. Public sector agencies often outsource some ATIS functions, resulting in a partnership between public and private sectors and a business model to manage project finances. As a result, the public-private partnership has emerged as a prominent strategy for ATIS cost management over the last two decades.

Business models must incorporate and reflect the relationship of the technologies in use, the owners of the ATIS technologies and functions, and the level of involvement of ATIS owners and partners. The basic business models fall into the following categories:

(1) Public-Centered: This model usually consists of public agency ATIS providers who operate the system in-house. In this case, the public sector agencies have the greatest measure of control over ATIS, but generate the least amount of revenue, thus requiring the highest level of public expenditures. Examples: Arizona—AZ Tech, Oregon—TripCheck.com

(2) Contracted: This business model allows the public sector to maintain overall control of the ATIS. This approach offers improved access to the private sector's technical expertise and staffing, but gives the public agencies the authority to establish the parameters and constraints it believes are important for the system. The public agencies pay a fixed amount to private sector entities for the outsourced services. Examples: MTC San Francisco Bay Area—511, Florida DOT.

(3) Asset Development & Management: This model has the same basic business structure as a contracted business model, but private sector entities are given contracts for ATIS product development, marketing and sales functions in addition to data fusion. The data collection function remains with public sectors. Examples: Florida DOT District 7 contract to Traffic.com

(4) Franchised: In this business case, public agencies use the private sector's technical skills and marketing capabilities. The most notable examples for this business model are advertising

campaigns or totally outsourced services. Examples: Virginia DOT Traveler Info, San Diego-Traveler Info- SANDAG 511, and Georgia 511 System.

(5) Private &Competitive: This business model maximizes the competition within the ATIS market; it is aimed at lowering consumer costs and maximizing private sector innovation. In this case, a public agency makes its data available to more than one company willing to provide data fusion services. It can be provided free or for a fee. The companies then add value according to their own business approaches and resell the data to the public and other information service providers. Examples: NAVTEQ, AAA Mobile Apps and Websites.

Over the last two decades, various business models have been tested; however, they are at various stages of evolution, cooperation, and functionality, due to rapid changes in technologies and integration capabilities. None of the business models has emerged as the best one that can be widely adopted by all public sector agencies to reduce their financial burden. So far, the most successful business model in terms of cost management is the one used by the Georgia Department of Transportation (GDOT) for its 511 system. GDOT contracts with a provider to maintain its web site and 511 system, which is known as Georgia Navigator. The contractor pays $1.7 million per year to GDOT, and generates income through Georgia Navigator site advertising, sponsorship of freeway 511informational signs, and callers' airtime minutes.

It is the public sector's goal to provide the best quality and most useful traveler information to the public; however, this can result in a high cost to taxpayers. In order to reduce the burden on public funds, the public sector may have to commercialize some components of its ATIS intellectual properties or raise revenue from government and non-government grants. This suggests two promising revenue generation options for the OTIIS project: (a) an invitation to private sector entities to express their interest for OTIIS ATIS; and (b) the Gift Economy Model. These two options are discussed in further detail below.

Private Sector Invitation through Request of Interest

If ATIS intellectual property is commercialized, a private sector entity that pays for intellectual properties will leverage maximum value out of it to earn a profit. To safeguard the interest of the public and private sectors, the best choice may be to establish business arrangements suitable for both public and private sectors. In this model, the public sector stakeholders (for this project, OTIIS Steering Committee) will decide what components of ATIS can be commercialized; then the stakeholders issue a **Request for Interest (RFI)** to private sector entities engaged in the business of data collection, the design and/or building of data systems, data dissemination to end users, fabrication of ATIS components/equipment, and provision of consumer information. In response to the RFI, private companies will express their interest and what they can offer. Based on the convenience of both the sectors, the stakeholders will make the final determination on business arrangements that are most suitable in the long-term for the OTIIS project.

Gift Economy Model

A gift economy is used for the transfer of goods or services without an agreed method of "give and take." This model is generally employed for the greater good of a society. Application of a gift economy principle varies widely, and it is dependent on the types of products, services, or promoters. The gift economy is an act of selflessness, there is an element of "Free play" (in other

words, there is not a fixed value of the gift.), and it incorporates a chain action-reaction quality. It catalyzes a process in which the selfless giving produces benefits for others, who in turn, are confer the benefit to more people. The gift economy model encompasses the following sub-models: Charitable Donations; Collectivism; Cooperativism; Donation Requests; Pay-what-you-want; and Pay It forward. The OTIIS project can use a combination of these sub models for securing enough funds for the project's operations and maintenance. Previously, exploring gift economy models to raise funds for ATIS projects was not feasible, convenient, or accessible. 2G, 3G, and 4G technologies have enabled faster data transmission speeds, greater network capacity and more advanced network services. Now, cell-phones have become minicomputers and provide greater convenience to access ATIS real-time information. The OTIIS project can leverage this opportunity to raise contributions from citizens who are going to use ATIS for their trips on I-94 and I-90 corridors. To download a mobile application of OTIIS, a donation request can be made. According to the Institute for Tourism and Recreation Research at the University of Montana, 680,000 personal vehicles and 714,000 CVO enters into Montana every year. If 10 percent of these vehicle operators contribute $ 1/year for downloading the OTIIS Mobile App, this project can become financially sustainable.

Alternatively, the OTIIS project can follow a business model similar to WhatsApp—a social media application. However, this will not fit into a gift economy model. WhatsApp generates its money by requesting $0.99 to download the iPhone version. The Blackberry, Android, Windows Phone and Symbian versions work with a subscription model of $0.99 per year. The subscription is free in the first year. Along the I-90 and I -94 corridors, numerous large scale communication corporations, software giants, retailers, travel and transportation companies are located. Approximately $100,000 grants from the community foundations of each of these groups could help to operate and maintain the OTIIS project.

OTIIS is a pool fund study funded by FHWA and administered by MDT. It would be crucial to form an organization that can own this project no matter which business model is selected. This organization can be either a travel information council, or a non-profit company, or a non-profit organization partnered by all participant states. The OTIIS steering committee may follow the model developed by TRANSCOM. It is a coalition of 16 transportation and public safety agencies in New York, New Jersey, and Connecticut states. It was founded in 1986 to provide a cooperative, coordinated approach to regional transportation management. Selection of a strong organizational model would help the steering committee develop a better business model for continuing the OTIIS project.

1 INTRODUCTION

The North/West Passage (N/WP) corridors follow I-90 and I-94 from Washington to Wisconsin through eight states and nearly 2000 miles. These two interstate highways comprise a major east-west corridor for commercial and recreational travel passing through Washington, Idaho, Montana, Wyoming, North Dakota, South Dakota, Minnesota and Wisconsin. The Operations and Travel Information Integration Sharing (OTIIS) Project will develop a traveler information platform to assist planning of long-distance trips, collecting and housing operational data, and understanding methods to modify driver behavior. OTIIS is administered by the Montana Department of Transportation (MDT), and endorsed and supported by the North/West Passage (NWP) pooled fund. This project is developed by the Western Transportation Institute (WTI) at Montana State University—Bozeman. The goal of this project is to promote the safety and efficiency of the I-90 and I-94 corridors by providing traveler information services based on conditions and data from of the transportation system.

An advanced Traveler Information System (ATIS), which is the end product of this project, requires significant investments for implementation, ongoing operation, maintenance, marketing, and enhancement to keep pace with new technologies. An estimated cost of this project is approximately $750,000 for development and $100,000 for routine operation and maintenance. The development and initial operation and maintenance expenses are paid from a pooled fund study sponsored by Federal Highway Administration. To make this project sustainable, partner states will have to contribute from their budgets or look for an alternate way to fund it. If any partners are not able to continue supporting the project due to economic reasons, this project may become vulnerable. Therefore, it is important to identify and evaluate alternate business models for making this project sustainable.

A public-private partnership is a common strategy for ATIS cost management. Partnerships between public and private agencies have resulted in various business models, such as public sector funded franchised models, private sector funded models, and business-to-business models. These models are being used by various states, private entities, and regional coalitions. Due to technological advances and a stronger focus on integrated ATIS operations and improved customer services, ATIS business models have been evolving to keep pace with these factors. Also, ATIS program administrators are challenged to adapt to increasing program costs, particularly with increasing demands for timely, accurate, and deliverable information in a wide variety of formats. In fact, each ATIS program is unique and many players play a role in its development; thus, each one requires its own business model. For example, Florida Department of Transportation (FDOT) has various partnerships with private to public entities for it traveler and traffic information programs throughout the state. For this, FDOT uses a combination of public sector funded franchised models, private sector funded models, and business-to-business models. Moreover, revolutions in cellphone and web-based technologies have attracted private industries to partner with public sector agencies for providing transportation information. Both public and private sector entities are looking for a business model that caters to their revenue needs.

This technical memorandum intends to answer the most critical question—which is the best model to generate enough revenue for supporting ATIS programs? The memorandum will focus on:

1. OTIIS Cost and Maintenance;

2. Fundamentals of ATIS program and various level of business opportunities;
3. Roles and responsibilities of public and private sectors;
4. Advantages and disadvantage of existing business models; and
5. Potential business model alternatives for the future generation of ATIS programs.

The findings in this report will help the OTIIS project steering committee to formulate strategies for encouraging private sector investment in ATIS services, as a way to further leverage ATIS data resources and to reduce OTIIS's cost of providing traveler information services. This chapter describes the purpose of this document and defines a concept of operations.

2 OTIIS SYSTEMS AND OPERATIONS OVERVIEW

For the Operations and Travel Information Integration Sharing (OTIIS) project, a website and a mobile-application will be created as end-products. The end products integrate four primary functions: data collection, data fusion, information dissemination, and system development and operations. This section describes the current and planned physical support environment that is needed for the entire travel system. This includes equipment, computing hardware, software, personnel, operational procedures, maintenance, and estimated costs, which include expected support from outside agencies.

2.1 Computing Hardware

The website will be hosted on a server at a location with power outage support equipment that will keep the server operational 24/7 in the event of a grid outage.

2.2 Software

The intention is to use open source software for the server and website creation, with the exception of using Google Maps API. Server software is the server's operating system. Website development software runs on the server. The software will require operational and maintenance support. Operational support involves checking the data's accuracy and timeliness (where applicable) before it is posted to the website, and responding to website crashes and trouble reports (i.e. addressing day to day issues). Maintenance support is required to update the server, website software and mobile apps, typically on a fixed schedule.

2.3 Personnel

The website will be supported by data quality control personnel and website maintenance personnel. Emergency response for the website will be provided from 8AM to 5PM week days. Operational support may be optimized for expected high traffic periods such as holidays, storm events, etc. Operational support staff will likely need training to provide data quality control. As stated in the system requirements, quality control will not include validating the accuracy of state-provided data but, will involve a method to ensure the state-provided data is translated accurately. A website trial period will include the first four to six months of operation after the final website design has been approved and the website deployed. This trial period will provide time for establishing better estimates of hosting and operational support requirements.

A rough estimate for operations and maintenance costs currently includes a 0.25 to 0.50 FTE personnel for staffing purposes. This estimate will be refined during the trial period once the challenges are better understood. The major factor that could be expected to increase operations costs is any revision to state provided data formats and access procedures. During the trial deployment, WTI will ask states to contact WTI 1-2 weeks in advance of any planned changes to their data formats or data provision procedures. This notification will facilitate any necessary changes to the software to ensure a smooth transition. Depending on the size and scale of the data changes, WTI may be able to evaluate if minor changes could fall within the estimated 0.25 – 0.50 FTE responsibilities or if they require much larger software alterations. **The estimated expenses may be $60,000 to $100,000. This amount is subject to change.**

2.4 Non-State DOT Data Sources

Non-state DOT data sources are expected to be used for weather forecasts, fuel stations, truck stops, tourist attractions, recreational activities, and other non-DOT website information. Quality non-fee based data sources will be given preference. Weather forecasts are expected to be obtained from NOAA.

2.5 Institutional Arrangements

State DOTs will provide access to their data feeds (XML, FTP, Database access, etc.) that are necessary to implement the OTIIS database and website. The OTIIS database will not scrape data from a state's website (HTML). The OTIIS website will identify any missing data. If an entire state's data is inaccessible, the deployment of the N/WP website will commence as planned with the available data from the other OTIIS states. A disclaimer to users about the missing/inaccessible state's data will be included on the website.

If the OTIIS website detects faulty data or large scale failures, the website will default to a static screen and provide links to individual member states' traveler information websites.

3 BUSINESS MODEL REVIEW

Business models for ATIS and other information systems continue to change from time to time to adapt and correspond to technological advances. However, the basic and distinct functions—data collection, data provision/fusion, information dissemination, and system development and operations— of the ATIS systems have remained the same. Business models are being developed to incorporate and reflect the relationship of the technologies in use, their functions, the owners of the ATIS technologies and functions, and the level of involvement of ATIS owners and partners.

This section provides a brief summary of the four distinct functions of ATIS; a review of public sector ATIS operations, outsourced operations, and business models; private sector strategies to sell their ATIS products through various models; and a summary discussion. This section is based on information from a review of literature review published between1991 to 2013.

3.1 Functions of Advanced Traveler Information Systems

An Advanced Transportation Information System has four distinct functions: (1) Data Collection; (2) Data Provision/fusion; (3) System Development and Operations; and (4) Information Dissemination. Business model frameworks are being built around these aspects as described in greater detail below.

3.1.1 Data Collection

Data collection is a critical step in the analysis process and an integral part of an advanced transportation information system. When developing an effective data collection program, the following critical factors are considered:

- Why should data be collected;
- What data must be collected;
- When should data be collected;
- What are the best data collection methods; and
- How much data should be collected?

Usually, state DOTs and other government agencies take a lead role in this function. However, private data collection companies such as Speedinfo, Traffic.Com, and TriChord have entered into the market, established their own roadside infrastructure, and sell their products to the public sector and other private industries.

This is an area where the most formal partnerships have emerged between the public and private sectors. The public sector will continue to dominate this area, because the installation of roadside infrastructure is an expensive and cumbersome process for private sector entities.

3.1.2 Data Provision/Fusion

At this level, the data fusion process occurs. Data fusion is the process of integrating data and knowledge from multiple sources into a consistent, accurate, and useful representation. After the data is made available in a presentable format, it is offered to the agencies, units, or private sector companies that engage in information dissemination. Usually, public sectors take a lead

for this level. Increasingly, however, private sector entities such as Traffic.com and Inrix are also involved with this type of operation.

The private entities gather data from a variety of fleets, the public sector, and other sources to provide a data feed with speed/flow (which includes real-time and predictive) as well as incidents. Although the public sector is a source of data to this feed, the expanded and presentable data is also sold to other public agencies, media outlets, in vehicle navigation system operators, and other potential customers Their customer base is broad – the data feeds can be a resource to both the public and private sectors to support a range of information dissemination methodologies.

3.1.3 System Development and Operations

This function involves development and operation elements of the traveler information system such as a data fusion engine, a database, reporting systems, system performance, output, and cliental elements.

3.1.4 Information Dissemination

This refers to the distribution of information to the general public, usually conducted by the government or an agency specifically authorized to release information for any public sector. This is the most prominent, lucrative, and financially feasible aspect of a public-private partnership. A 511 system is the most notable example of a public-private partnership in this category. For example, Virginia Department of Transportation (VDOT) has given a contract to TrafficLand to coordinate dissemination of VDOT's video images through Web and broadcast media.

Florida Department of Transportation had formed various partnerships for all of its ATIS functions. For examples, FDOT contracted out data collection of incident, construction, and special event information that feeds to 511 systems to Castle Rock Inc. It has also contracted out development and maintenance of the advanced traffic management system software and data fusion engine for the City of Orlando. Moreover, an Orlando traffic management center was being managed by Traffic Management of Inc. Logic Tree, a 511 phone system contractor, ran the 511 system of Florida (Bugress et.al, 2007; ITS America, 1998).

Government agencies are typically the largest investors in ATIS infrastructure through the use of tax payer money. Public sector agencies (such as state DOTs, FHWA, public undertakings, and regional coalitions) play a key role in determining how the ATIS would function, based on their capabilities and resources. Public sector agencies often outsource some ATIS functions, which results in a partnership between public agencies or between public and private sector agencies. This also develops into a business model to manage project finances. The following section clarifies the roles of public sectors and their partners when they conduct in-house and outsourced operations.

3.2 Public Sector Operation Option

Typically, public sector agencies have two primary options for operating ATIS, as shown in Table 1. The first option includes either keeping the operation in-house or outsourcing selected ATIS functions. The other choice is to contract out the ATIS operation. Both options have advantages and disadvantages, some of which are presented in Table 2.

Table 1 Public Sector Operation Option

Public Centered Operations	Contracted Operations
• The public sector is responsible for a majority of data collection, fusion, dissemination • Generally makes data available to outside interests at no charge • May involve the private sector, but in very defined roles, such as to supplement data collection • May or may not use agreements or contracts for the private sector roles or for access to data • Flexibility in terms of contracting with multiple private partners on a non-exclusive basis	• The private sector has a significant role in one or more elements of the traveler information program (data collection, fusion, dissemination, system operations, etc.) • The private sector operates under contract to the public sector; the private sector is providing a contracted service, and there is not an expectation that they will generate revenue to sustain or support operations • Still considered a 'public' system • The public sector can expand traveler information service capabilities by contracting with multiple private sector entities • Most often utilized for urban area/regional systems
Examples: AZTech™, Phoenix, AZ Kansas DOT (Statewide) Oregon DOT TripCheck	*Examples:* MTC, San Francisco Bay Area, CA Tampa Bay Area, FL (511 service) Florida DOT Statewide (iFlorida)

Reference: 1. Bugress et.al, 2007. P. 9, 2. ITS America, 1998

3.3 Business Models

Through the use of public and private partnerships, various business models have been developed for ATIS as show in Table 2. These business models have their own risks and potential revenue opportunities.

Table 2 Business Models for Advanced Traveler Information System

Business Model	Advantage/Disadvantage	Revenue/Risk
Public Centered Examples, Arizona—AZ Tech Oregon—TripCheck.com	• The public sector (State Department of Transportation [DOT]) does majority of data collection and aggregation • The public sector disseminates information to the public, other agencies and to multiple private sector entities • The private sector can add value and resell traveler information • The public sector has primary control over system • Limited opportunities for revenue. • Requires a substantial amount of funding, leadership and involvement, • Not dependent on private sectors for any supplemental data.	Least Risk
Contracted Examples, MTC San Francisco Bay Area—511 Florida DOT	• Strong involvement from the public sector for data collection and dissemination • Contract with the private sector to perform most of the data fusion process • Private sector serves under a termed contract in a fee-for service arrangement for a specific function of ATIS. • Limited opportunities for revenue (other than contracted elements)	Least Potential for Revenue
Asset Development & Management Examples, Florida DOT District 7 contract to Traffic.com	• Strong involvement from the public sector for data collection • Includes the private sector for data fusion and asset management (develop and market products/services to sell to the public) • Asset manager element increases opportunities and emphasis on revenue, but revenue would support enhancing the public sector capabilities	
Franchised Examples, Virginia DOT Traveler Info San Diego- Traveler Info- SANDAG 511 Georgia 511 System	• Strong involvement from the public sector for data collection and dissemination (through public infrastructure) • Private sector is responsible for providing data (data fusion) and dissemination of some or all functions of ATIS • Private sector raises revenue through capital investors, usage fees, license fees or advertising • Limits ‘free’ information available from the public sector to maximize revenue opportunities for the private sector • Public sector costs are reduced • Private partner franchise has exclusive access to public data • Substantial investment for development and implementation of ATIS. • Relies heavily relied on advertisements • Higher risk for both public and private partners	Higher Risk
Private & Competitive Examples, NAVTEQ, AAA	• The public sector performs data collection and makes it available to multiple private sector entities • Some level of free information provided to public • Emphasis is on the private sector marketing products and services to the general public as well as other private partners • Maximizes competition in the traveler information marketplace • Requires a large market to sustain multiple companies and products	Higher Potential for Revenue

Note: Data fusion is the process of integration of data and knowledge on the same topic from multiple sources into a consistent, accurate, and useful representation.

Reference: 1. Bugress et.al,, 2007. P.5;

2. ITS America, 1998

3.4 Private Sector Business Models

In order to understand the cost management aspects of ATIS business models, it is important to review the private sector's business strategies. Private sector agencies sell their products or services through various business models as presented below. Public sector agencies have tried to replicate the success of private agencies with limited success. Here, five types of ATIS private sector business models are discussed.

3.4.1 Services for Fee

As shown in Table 1, the private sector operates under contracts to the public sector. The public sector agencies pay a fixed fee for the services. Sometimes, the public agencies expand traveler information service capabilities by contracting with multiple private sector entities. This is most often utilized for urban areas/regional systems. As described earlier, Florida DOT has contracted various ATIS services to private sector entities (Bugress et.al, 2007).

3.4.2 Private Sector Operations Without Funding from the Public Sector

A 511 service is the most notable example of this kind of business model. In the case of MoDOT, Traffic.com provided free and legitimate traveler information services. Although this is a free service, MoDOT holds the rights to the 511 number allotted by the Federal Communications Commission. Traffic.com earns revenue from a 511 caller's charges. The American Automobile Association operates a hotline and a website with road and travel conditions in Michigan. This provided an opportunity to AAA Michigan to promote their services including trip planning, insurance, and membership. In this case, there is not a contract between Michigan DOT and AAA Michigan. Moreover, AAA has launched a nationwide AAA Mobile App. Here is the link to the AAA Mobile App for Traveler Information Systems:

www.**aaa**.com/**mobile**

3.4.3 Free Service Supported by Advertising

Traveler information services through broadcast television and radio is the most successful and longstanding business model. This model produces sustaining revenue. Recently, this model has been translated into internet based services including websites, social media, twitter, cellphone applications, and similar services. Private companies run advertisements or provide subscription services in order to raise revenue. In general, the Internet based model is not proven to be profitable. Global level players such as Yahoo, MSN, Google, the Weather Channel, and transportation specific private sector agencies including Maptuit, Mapquest, and Traffic.Com operate the free traveler information services.

A franchised model of public sector is the same as this model. For example, in 1997-98, Washington State Department of Transportation (WSDOT) entered into an advertisement agreement with an outdoor equipment retailer (REI) for the mountain pass line ATIS. Per the agreement, REI paid $30,000 for a phone line and $ 10,000 for web-advertising. For 1998-99, the congestion information service over the phone service was contracted to Toll Free Cellular Company. However, this company went out of business in early 1998. In the late 1990s, WSDOT explored the advertisement as a source of revenue for its statewide ATIS and estimated revenue of $ 195,000. However, WSDOT was not able to secure a sponsorship. (Bradshaw et.al, 1999).

3.4.4 Subscription Models

This business model is adopted by private sector agencies that are engaged in the business of in-vehicle and portable GPS devices, satellite radio/phone, cell-phone applications, and similar technologies. A traveler information package is typically bundled with the devices' sale. Many of the device companies (such as Tom Tom and Garmin) used to provide free basic service for a certain number of years and premium services were available for a fee. This is also known as a Freemium business model. Now, the devices are being replaced by smart phones. This has changed the typical subscription model, and traveler information has become a value added feature of a smartphone plan's bundled services.

3.4.5 Value-added Reseller Models

Private sector companies such as Inrix, TRANSCOM, Traffic.com, and TrafficCast collect data from public agencies' open data sources, fuse it, and resell it to the GPS device manufacturers, cellphone service providers, and other online sources. This data either enhances the services or adds value to the service provider.

3.5 Conclusion

Traveler information is no longer a standalone function and has become an integrated operation. Over the last two decades, various business models have been tested; however, they are at various stages of evolution, cooperation, and functionality, due to rapid changes in technologies and integration capabilities. None of the business models has emerged as the best one that can be widely adopted by all public sector agencies to reduce their financial burden. The following examples show that a business model that is suitable to one entity may yield different results for others.

(1) The Georgia Department of Transportation (GDOT) contracts with a provider to maintain their web site and 511 systems, which are collectively known as Georgia Navigator. The contractor pays $1.7 million per year to GDOT. The contractor generates income through Georgia Navigator website advertising, sponsorship of freeway 511 informational signs, and caller's airtime minutes. So far, this is the most successful ATIS business model in terms of cost management.
(2) Missouri Department of Transportation (MoDOT) tried to develop a model based on the GDOT sponsorship model. However MoDOT could not launch its 511 service to enhance its traveler information service.
(3) Oregon Department of Transportation (ODOT) has also collaborated with a public agency called the Oregon Travel Information Council (TIC) for its statewide traveler information system, which is branded as TripCheck. TIC is responsible for selling Interstate logo signs. As a part of the collaboration, TIC sells the advertisement space on TripCheck website to its customers. The advertisements generate approximately $15,000 per year in revenue to ODOT. This helps to cover some of the operating costs of TripCheck (Crowson & Deeter, 2013., Deeter, 2009).

The most sustainable model requires significant resources, leadership, and investment from the public sector. For example, the Bay Area MTC invited private sector representatives to their 511 strategic planning process in 2005 and 2006 so they could begin discussing future business models and roles. In short, defining three important aspects of an ATIS system can help to formulate a framework for an effective ATIS business model. These aspects include:

1. Access to information: who can access public information and how;
2. Distribution of revenue-who pays for what and how; and
3. Intellectual property rights-who owns what and who can have access to that knowledge.

Rapid changes in technology also require innovative business models that can cater to the financial needs of a project or to a technology to make it accessible, affordable, and efficient.

4 POTENTIAL ALTERNATIVES

Several ATIS business models have been tried over the last two decades, with limited success. The predominant business model (public sector owned) and other business models discussed in this report have not yet proven viable or sustainable. It is the public sector's goal is to provide the best quality and most useful traveler information to the public; however, this can result in a high cost to taxpayers. In order to reduce the burden on public funds, the public sector may have to commercialize some components of its ATIS intellectual properties or raise revenue from a combination of government and non-government grants. This suggests two promising revenue generation options for the OTIIS project: (1) an invitation to private sector entities to express their interest for OTIIS ATIS; and (2) the Gift Economy Model. These two options are discussed in further detail below.

4.1 Private Sector Invitation Through Request for Interest

If ATIS intellectual property is commercialized, a private sector entity that pays for intellectual properties will leverage maximum value out of it to earn a profit. To safeguard the interest of the public and private sectors, the best choice may be to establish business arrangements suitable for both public and private sectors. For this model, the following assumptions are made.

1. The OTIIS project does not have the resources to explore and/or operate all potential, long-term information dissemination options.
2. The OTIIS project steering committee would not like to enter into a consumer-based business arrangement (i.e. selling commercial products, advertisement slots, etc. at a store, highway signs or online).
3. The private sector is better equipped to provide targeted information to specific markets (i.e. individualized services).

In this model, the public sector stakeholders (for this project, "OTIIS Steering Committee) will decide what components of ATIS can be commercialized and issue a **Request for Interest (RFI)** to private sector entities engaged in the business of data collection, the design and/or building of data systems, data dissemination to end users, fabrication of ATIS components/equipment, and provision of consumer information. In response to the RFI, the private sector will express their interest and what they can offer. Based on the interests of both sectors, the stakeholders will determine what business arrangements are most suitable in the long-terms for the OTIIS project.

4.1.1 What Should Be in the RFI?

Suggested contents:

- Clearly defined goals and objectives of the project and its partnership with private sectors;
- Clearly defined roles and rights of the OTIIS steering committee;
- Procurement process;
- Sponsorship parameters; and
- Revenue collecting/sharing options (Crowson & Deeter, 2013).

4.1.2 What Do Private Sector Agencies Bring to the Table?

Private sector agencies can:

- create and distribute outreach materials to private sector ATIS service providers to generate interest in doing business with the OTIIS project;
- answer queries from prospective users of the OTIIS data;
- investigate new potential market segments toward which to target ITS;
- bring enhancements and outreach;
- solicit additional public agencies (and private sector entities) that collect transportation system data to make those data available on the OTIIS to expand its geographic coverage and capability;
- develop and implement improvements to the OTIIS processes, hardware, software, and tools;
- provide technical support to new data providers and data users; and
- develop and implement improvements to data quantity, quality, and reliability (Bradshaw et. al. 1999)

4.1.3 Who Should Be Invited to Express Interest?

As shown in Table 3, private sector entities engaged in a broad range of products and services should be invited to express their interest in commercialization of OTIIS ATIS.

Table 3 Private Sector Entity Examples

Category	Type of Private Sector Entities	Examples
Data Collection and Data Providers	Traffic Condition Monitoring and Reporting Companies	*Here.com*, clearchannel.com (Shadow Broadcast Services, Metro Networks, Total Traffic Network, SigAlert and Traffax) trafficmanagement.com
Data Systems Design/ Build companies	Transportation planning/engineering consulting firms	inrix.com
	ATIS specialist companies	speedinfo.com, here.com
	Cable companies	clearchannel.com
	Cellular telephone operators	cellint.com
	Telecommunications companies	logictree.com
	Software developers	trichord-inc.com
Data Dissemination to End Users	Independent service providers that market information	logictree.com
	Over wireless services: cellular, FM subcarrier	inrix.com
	Specific devices: in-vehicle navigation services, other personal digital assistant manufacturers	tomtom.com garmin.com
	Internet or other wire-based communications service	teleatlas.com
	Media (radio, TV, Internet, newspaper)	clearchannel.com
	Cable companies	Clear Channel's Traffic Message Channel — also known as Total Traffic Network (FM), NAVTEQ Traffic RDS (FM), SiriusXM satellite radio's NavTraffic (satellite)
	Web services	Google.com, Mapquest.com Microsoft, Akamai, ESRi, Bing.com
ATIS Components & Equipment Manufacturer	Traffic equipment vendors	Grainger.com
	Automotive companies	Toyota, Honda, Ford, etc.
	Traffic signal vendors	tapconet.com/
Consumers Companies	Commercial trucking organizations	truckline.com/, ntea.com
	Parcel delivery firms	United Parcel Service (UPS) and FedEx, USPS, DHL
	Logistics firms	dbschenkerusa.com, Union Pacific Co. Penske Truck Leasing, U-Haul, Swift
	Fleet management systems	fmsgps.com, gefleet.com, motorolasolutions.com
	Large employers and Associations	Aaa.com, Gieco.com, Progressive.com,www.statefarm.com www.allstate.com, Universities, hospitals, corporations

4.1.4 When Should RFI Be Issued?

The OTIIS project will be completed by the end of December 2014. RFI issuance and the project development should be a concurrent process. If the RFI is issued by the end of July and the steering committee receives the expression of interest by August 31, 2014, this will give enough time to the steering committee to make a decision on the potential business model. Once the decision has been made, the design development team will have a couple of months to make necessary changes and coordinate with a private sector partner before the project launch date.

4.1.5 What are the Benefits of an RFI?

The RFI process has numerous benefits. It can provide firsthand knowledge of private sector expectations and what they have to offer. It can also bring to light unforeseen questions and potential issues about technical, administrative, and marketing needs. This would provide OTIIS stakeholders with an excellent opportunity to solicit information prior to making their decision about the best business model, as well as its specific terms and conditions.

4.1.6 Who would be legally entitled to release the RFI?

The OTIIS project is administered by MDT; therefore, MDT administration has the final authority to authorize or sign off on any business document, mechanism, or agreement. Any plan to release an RFI, RFP, or any other contract offer will have to follow MDT rules, oversight, and management. This process may result in administrative costs to MDT or to this project.

4.2 Gift Economy Model

A gift economy is used for the transfer of goods or services without an agreed method of "give and take." This model is generally employed for the greater good of a society. Application of a gift economy principle varies widely, and it is dependent on the types of products, services, or promoters. The gift economy is an act of selflessness, there is an element of "Free play" (in other words, there is not a fixed value of the gift.), and it incorporates a chain action-reaction quality. It catalyzes a process in which the selfless giving produces benefits for others, who in turn, are confer the benefit to more people. (Service Space, 2014).

The gift economy model encompasses the following sub-models:

(1) Charitable Donation: a philanthropic gift of money, goods, lands, or services. Many corporate foundations have donated to alternate transportation projects for National Parks such as Acadia, Zion, Glacier, and Rocky Mountains. L.L.Bean, an outdoor apparel and equipment company, contributed more than $ 2 million for the transit services at Acadia National Park.

(2) Collectivism: A common pooling of resources that are redistributed without regard to contribution source, for example, a pot luck lunch, a group trip. A pooled-fund project can be counted as collectivism.
(3) Cooperativism: Multiple individuals come together to create services or products of social value and available to all for free. Obantu—Linx Operating system, Wikipedia, the Lost Type, and many other open source softwares, and many food stores are examples.
(4) Donation Requests: In this model, a donation is requested for a product or service.
(5) Pay-what-you-want: In this model, a buyer sets a price for a product and pays according to his/her will. A tip for a service is one of the most common examples.
(6) Pay It forward : In this case, a person receives the benefit of products or goods that are paid by someone else. A similar action is expected from that person to pay for products or goods so the benefits can be extended to others. Examples include Karma kitchens in metropolitan cities like Berkeley, CA, Washington DC, and Chicago, IL, (Service Space, 2014).

The OTISS project can use a combination of the models above for securing funds for the project's operations and maintenance. Previously, exploring gift economy models to raise funds for ATIS projects was not feasible, convenient, or accessible. Advertisements on the ATIS websites have not yielded good results. Computers with internet were the only source of real-time information; however, they were not feasible to move around. Thus, ATIS users were not able to access real-time information while driving, except for calling 511 service. 2G, 3G, and 4G technologies have enabled faster data transmission speeds, greater network capacity and more advanced network services. Now, cell-phones have become minicomputers and provide greater access to ATIS real-time information. The OTIIS project can leverage this opportunity to raise contributions from citizens who are going to use ATIS for their trips on the I-94 and I-90 corridors. According to the Institute for Tourism and Recreation Research at the University of Montana, 680,000 personal vehicles and 714,000 CVO enters into Montana every year. If 10 percent of these vehicle operators contribute $ 1/year for downloading the OTIIS Mobile App, this project can become financially sustainable. The mobile app has the potential to yield enough revenue every year. Here are conceptual mobile application screen shots from the mobile app search to contributions for the project.

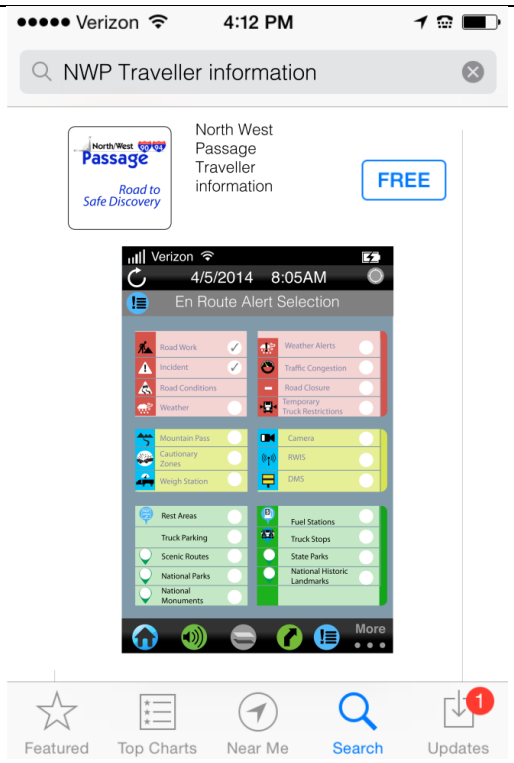

Figure 1 Application Search

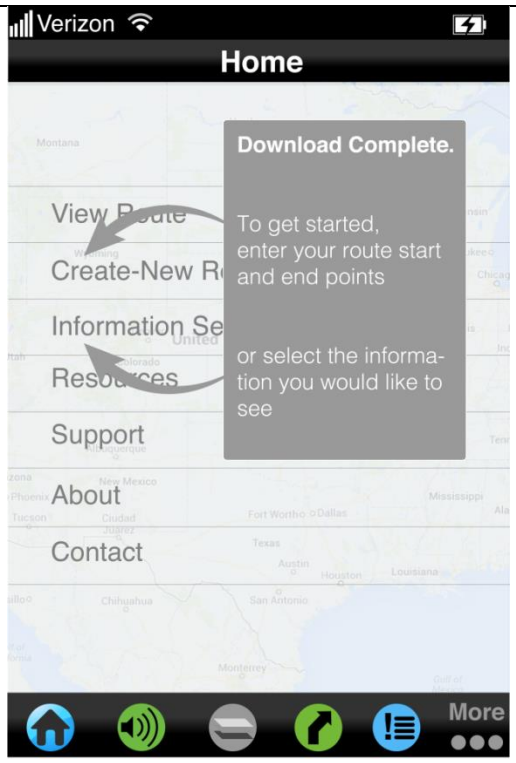

Figure 2 Download Complete

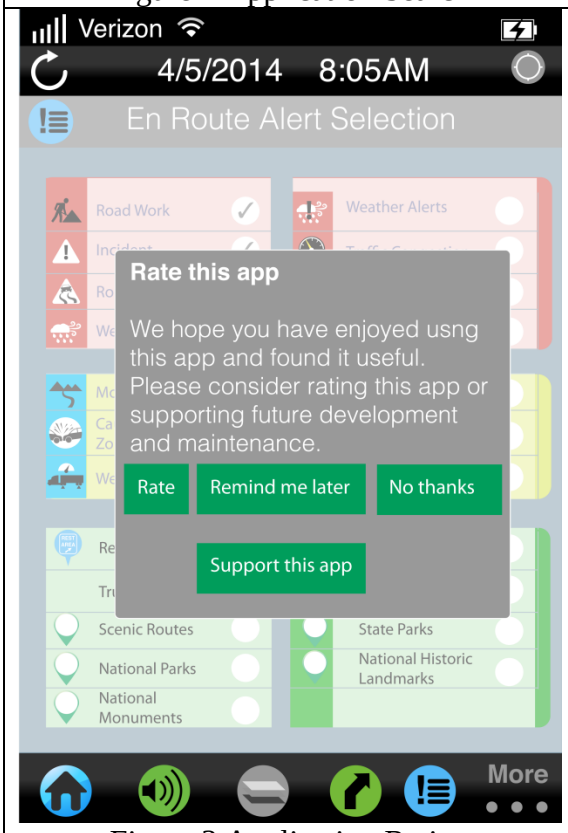

Figure 3 Application Rating

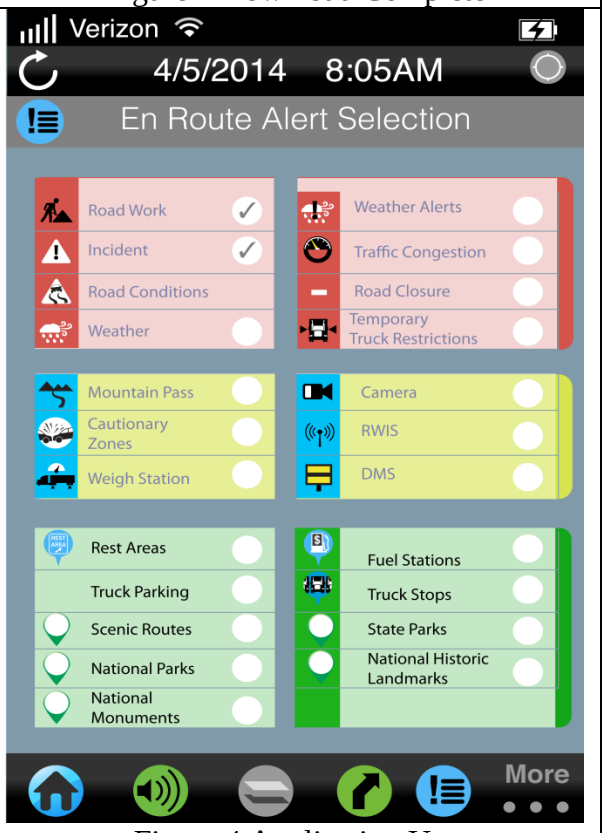

Figure 4 Application Use

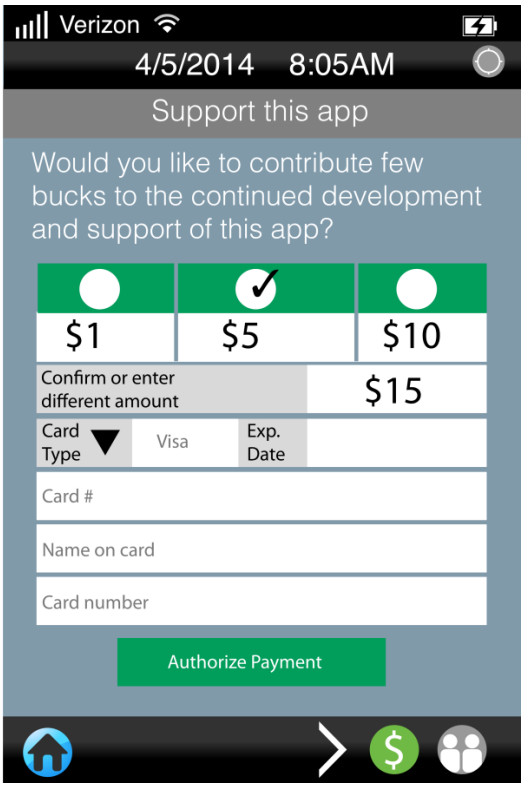

Figure 5 Application Support

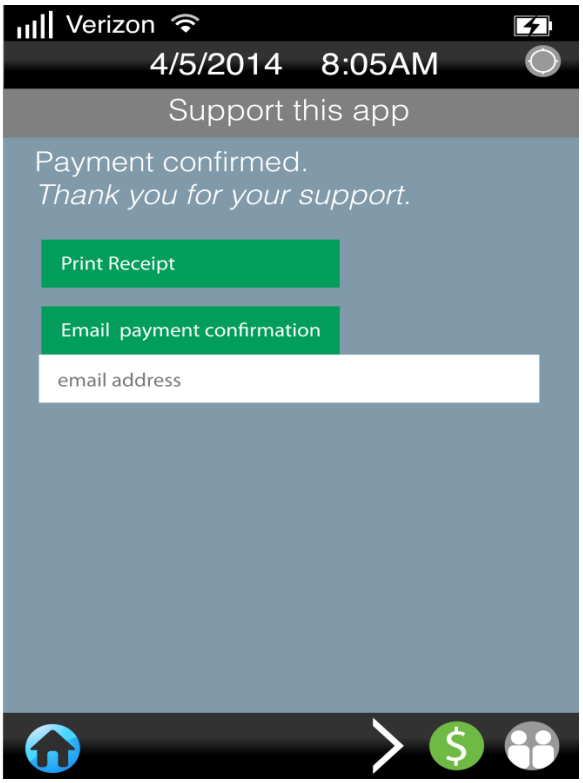

Figure 6 Payment Confirmation

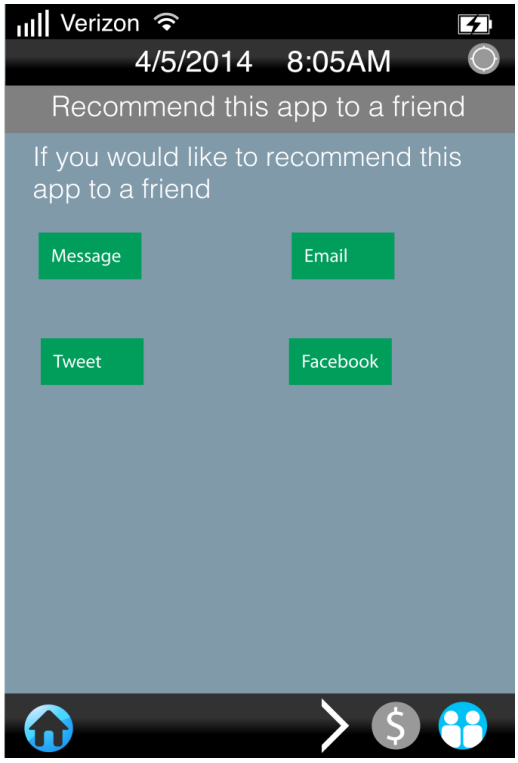

Figure 7 Application Recommendations

Alternatively, the OTIIS project can follow a business model like WhatsApp—a social media application. However, this will not fit into a gift economy model. WhatsApp generates its money by asking $0.99 for downloading the iPhone version of the application. The Blackberry, Android, Windows Phone and Symbian versions work with a subscription model of $0.99 per year. The subscription is free for the first year.

Many large-scale businesses are based along the I-90 and I -94 corridors, including communication corporations Fisher Communications, RealNetworks), Software giants (Blucora, F5 Networks, Mentor Graphics, Microsoft, etc), retailers (Costco, Wholesale, Amazon.com, Blue Nile, Nordstrom, Starbucks), travel and transportation companies (Alaska Air, Expedia, Expeditors International, Greenbrier Cos, Paccar, Ambassador Group, Red Lion Hotels, Lithia Motors). If the community foundations of these groups each donated approximately $100,000 in grants, it would help to operate and maintain the OTIIS project. This business model can be called, **"A Few Share and All Benefit."** This would also allow the corporations to show that they are committed to safe travel across the corridor.

5 NEXT STEPS

OTIIS is administered by MDT and sponsored by FHWA. Ultimately, management and fiscal responsibilities lie with MDT. MDT may opt to form an organization that can own this project, regardless of initial business model selection. This also impacts how revenue can be collected and distributed, what MDT can and would be willing to do to support the long term financial management of the program needs to be discussed in detail. If MDT is not a viable option other financial and project management alternatives will need to be investigated. For this project, various intellectual properties from various states are being utilized. Thus, This organization alike TRANSCOM would be more appropriate to manage the intellectual properties. TRANSCOM is a coalition of 16 transportation and public safety agencies in New York, New Jersey, and Connecticut states. It was founded in 1986 to provide a cooperative, coordinated approach to regional transportation management. MDT with the help of the steering committee can form a travel information council, or a non-profit company, or a non-profit organization partnered by all participant states. Selection of a strong organizational model would help the MDT and the steering committee develop a better business model for continuing the OTIIS project.

If the OTIIS steering committee decides to release an RFI with a support from MDT to select a business model, it can follow the example of the Virginia DOT (VDOT) SAVE program. VDOT created a Sponsorship, Advertising, and Vending Enhancement (SAVE) program to optimize potential revenue opportunities through a request for proposal (RFP) and a single contract. Under this program, VDOT released a RFP for VDOT Safety Rest Area & Welcome Center to establish a contract through competitive negotiation to create new and maximize existing revenue streams for VDOT by providing more comprehensive information of specific interest to the traveling public at the safety rest area and welcome center facilities (VDOT, 2013). In January, 2014, VDOT issued a RFP to solicit design-build proposals from those entities interested in contracting to serve as the Design-Builder for the I-77 Active Traffic and Safety Management System (ATSMS) in Carroll County, Virginia. The ATSMS project's scope of work to be undertaken by the Design-Builder under this project will include: (a) project management and coordination; (b) preliminary engineering; (c) ITS design; (d) sign structure and foundation design; (e) clearing and grubbing; (f) infrastructure construction; (g) ITS device installation and configuration; (h) utility additions, adjustments, and coordination; (i) static guide sign fabrication and installation; (j) minor temporary roadway improvements (staging/pull-out areas); (k) guardrail installation; (l) earthwork as required for foundation installation; (m) traffic maintenance and management; (n) system integration; (o) system testing and acceptance; (p) training; (q) system maintenance until final acceptance; and (r) system documentation (VDOT, 2014).

Regardless of which business model is selected, the steering committee should address the following issues in the formal agreements developed with private sector entities:

- roles and responsibilities;
- hours of operation;
- maintenance requirements and response times;

- data accuracy;
- reporting requirements;
- security and data access;
- configuration management;
- standards and protocols;
- system documentation;
- operational agreements; and
- consistency with the National ITS Architecture (Bradshaw et.al, 1999)

In addition, three key questions need to be answered to develop an effective business model framework:

- What do stakeholders really want to provide to the public?
- What can be realistically accomplished?
- What services does it make sense to contract with a private partner for expertise and resources?

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