CENTRAL TEXAS
Regional Mobility Authority

AGENDA ITEM #8 SUMMARY

Authorize the Executive Director to negotiate a proprietary purchase from Metropia, Inc., for software and a smartphone application to manage traffic congestion resulting from construction of the MoPac Improvement Project.

Strategic Plan Relevance: Regional Mobility, Innovation

Department: Operations

Associated Costs: TBD

Funding Source: MoPac Improvement Project funds

Board Action Required: Yes

Description of Matter: Metropia, Inc., provides a unique incentive based traffic congestion management software and smartphone application that assists its users in avoiding traffic delays by providing real-time traffic information, but also a prediction of near-time future congestion. Travelers are provided with an incentive to contribute to lessening traffic congestion by changing their travel time to a less-congested time period or by choosing an alternative route offered by the application instead of a congested route. Metropia, Inc., was the only respondent to a Request for Information issued by the Mobility Authority for incentive-based congestion management software.

The application offers multiple routes around congested areas and allows for client (Mobility Authority) input regarding route restrictions (i.e. local neighborhood streets). This application is being considered to assist in managing and routing traffic during the construction of the MoPac Improvement Project and continuing to assist in managing traffic corridors throughout the Central Texas Region.

Reference documentation: Draft Resolution
Response to RFI from Metropia, Inc., dated January 3, 2014

Contact for further information: Tim Reilly, Director of Operations

If the executive director finds that the authority's requirements for the procurement of a general good or service describe a product that is proprietary to one vendor and do not permit an equivalent product to be supplied, the authority may solicit a bid for the general good or service solely from the proprietary vendor, without using the competitive bidding or competitive proposal procedures. The executive director shall justify in writing the authority's requirements and shall submit the written justification to the board. The written justification must:

(i) explain the need for the specifications;

(ii) state the reason competing products are not satisfactory; and

(iii) provide other information requested by the board.

GENERAL MEETING OF THE BOARD OF DIRECTORS
OF THE
CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

RESOLUTION NO. 14-___

AUTHORIZING THE EXECUTIVE DIRECTOR TO NEGOTIATE A PROPRIETARY PURCHASE FROM METROPIA, INC., FOR SOFTWARE AND A SMARTPHONE APPLICATION TO MANAGE TRAFFIC CONGESTION RESULTING FROM CONSTRUCTION OF THE MOPAC IMPROVEMENT PROJECT.

WHEREAS, the Mobility Authority has started construction of the MoPac Improvement Project, and anticipates that travelers on MoPac will face increased traffic congestion while the project is under construction; and

WHEREAS, in an effort to identify methods to reduce and address traffic congestion on MoPac, the Mobility Authority on December 20, 2013, issued a request for information for vendors who could provide an incentive-based traffic congestion management software and smartphone application (the "RFI"); and

WHEREAS, Metropia, Inc., was the sole respondent to the RFI, and the Executive Director recommends negotiating with Metropia, Inc., to reach an agreement for the use of their product to by the Mobility Authority.

NOW THEREFORE, BE IT RESOLVED, that the Board hereby authorizes the Executive Director to negotiate an agreement with Metropia, Inc., for the product and services described in its response to the RFI, on terms and conditions as the Executive Director determines is in the best interests of the Mobility Authority; and

BE IT FURTHER RESOLVED, that any proposed agreement with Metropia, Inc., must be authorized by future Board action.

Adopted by the Board of Directors of the Central Texas Regional Mobility Authority on the 29th day of January, 2014.

Submitted and reviewed by:

_____
Andrew Martin
General Counsel for the Central
Texas Regional Mobility Authority

Approved:

_____
Ray A. Wilkerson
Chairman, Board of Directors
Resolution Number 14-___
Date Passed: 1/29/2014

CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

REQUEST FOR INFORMATION ("RFI") FOR INCENTIVE-BASED TRAFFIC CONGESTION MANAGEMENT SOFTWARE AND SMARTPHONE APP

Release Date: December 20, 2013

The Central Texas Regional Mobility Authority ("Authority") is soliciting information to identify vendors who may offer an existing software application capable of providing traffic congestion management for central Texas regional roadways. The application should analyze real-time traffic data to provide alternative, less-congested route recommendations based on that data, and communicate information about current and projected traffic congestion to drivers through a smartphone application. The application must also provide an incentive to motivate drivers to choose an alternative route to a route with extreme traffic congestion, thereby improving the efficiency of travel for drivers throughout the region.

The Authority is issuing this Request for Information ("RFI") to notify firms of the Authority's interest in acquiring a software tool that includes, as a minimum, the features and elements described by this RFI. However, the Authority has not committed to acquire any software product or service by issuing this RFI, including a software product that meets all the criteria described below. Once the Authority ascertains that one or more software applications may satisfy the criteria discussed in this RFI, the Authority may elect to proceed with a procurement of software and services in accordance with Authority's Policies and Procedures Governing Procurements of Goods and Services ("Procurement Policies").

Responses to this RFI are due by 4:00 p.m., CST, January 6, 2014.

I. OVERVIEW

The Authority is a regional entity granted broad powers under state law to study, design, construct, operate, expand, enlarge, and extend transportation projects in Travis and Williamson Counties and additional areas as permitted by law. The powers and duties exercised by the Authority and its Board of Directors (the "Board") are established by and subject to state and federal laws and regulations.

II. DESCRIPTION OF THE MOPAC IMPROVEMENT PROJECT

The Authority, through its design-build contractor, has begun construction of the MoPac Improvement Project (the "Project"). The Project is approximately 11.9 miles in length, from just north of Parmer Lane (FM 734) southerly to Cesar Chavez Street. The Project includes two dynamically-priced tolled lanes (one lane in each direction) constructed along the inside median of the existing Loop 1 facility by widening pavement and bridges and, in some areas, reducing the width of the existing lanes and shoulders. Construction is anticipated to last through early 2016, during which time traffic congestion on Loop 1 is anticipated to greatly increase. More information on the Project is available at http://www.mobilityauthority.com/projects/mopac-improvement.php and at http://www.mopacexpress.com.

The Authority seeks information on immediately available software applications to manage traffic and congestion resulting from and during construction of the Project. In addition to this immediate need, the Authority anticipates that a traffic congestion management software application could and would be used to manage traffic and congestion on other regional corridors and roadways in central Texas.

III. CONTENT OF RESPONSES

A. General Information: Responses to this RFI should include the following information:

1. An overview of the entity providing the software application, and the name and contact information (mailing and email addresses; telephone numbers) for the principal contact for that entity.

2. A brief summary of the entity's experience in developing and implementing traffic congestion management software.

3. A short description of the location, history, and results from actual implementations of the software, including the name and contact information for one or more individuals associated with the agency or customer who acquired and implemented the software application who can be contacted as a reference.

B. Software Application: Please provide the following information concerning the traffic congestion management software application your entity offers:

1. Provide the product name, initial release date, and all subsequent updates and releases of the software application and related smartphone application.

2. Identify each mobile operating system (iOS, Android, Windows, etc.) for which there is an existing mobile application; and the projected release date for any mobile application planned for release on or before August 1, 2014.

3. Describe whether, and if so how, the software identifies existing traffic congestion and predicts near-term future congestion by using real-time traffic data. Describe all sources of real-time traffic data used by the application to identify and predict congestion.

4. Does the software have the capability to push specific information provided by the sponsoring entity to mobile users, such as construction work schedules and work zones, location of traffic accidents or road blockages, or other information that may have an impact on suggested routes provided by the software? If so, please briefly describe the process and requirements for pushing information to mobile users.

5. Can information be pushed to sub-sets of mobile users, based on specific criteria (for example, current location of the smartphone)? If so, please describe the capabilities to target a sub-set of mobile users to receive a push of information by specific criteria.

6. Describe any incentives offered though the mobile application for drivers to change their behavior in a way that reduces traffic congestion, such as changing the time or routing of a trip.

7. Describe any controls or restrictions that can be established by the sponsoring entity to manage available routes or timing information and the incentives offered through the software program.

8. Describe any features of the software program or smartphone application that have not already been addressed (existing or planned for release on or before August 1, 2014) that increase its value as a regional traffic management solution.

9. Describe the general terms of agreements between entities supplying incentives or rewards and your entity and/or the sponsoring entity.

IV. QUESTIONS CONCERNING RFI

All inquiries concerning this RFI must be submitted in writing (including via email) to the Authority's contact as follows:

Central Texas Regional Mobility Authority
3300 North Interstate 35, Suite 300
Austin, Texas 78705
ATTN: Tim Reilly, Director of Operations
Email: treilly@ctrma.org

Questions regarding this RFI must be received by the Authority by 4:00 p.m., CST, December 30, 2013. Responses to these inquiries will be posted on the Authority's website (www.mobilityauthority.com) for the benefit of all potential responders.

Note also that Authority may periodically post information concerning the RFI on its website, and all interested parties should monitor Authority's website for additional information.

V. SUBMITTAL OF RESPONSES TO RFI

Responses should be limited to no more than ten (15) single-spaced pages in length. Respondents should provide five (5) complete paper copies and one complete electronic copy (on CD, DVD, or flashdrive) of their RFI response **no later than 4:00 p.m. CST, January 6, 2014.**

Responses must be sent or delivered to:

Central Texas Regional Mobility Authority
3300 North Interstate 35, Suite 300
Austin, Texas 78705
ATTN: Tim Reilly, Director of Operations

VI. SUBSEQUENT ACTIONS/ONE-ON-ONE MEETINGS

The Authority will review the responses to this RFI and will use the information contained in the responses to assist the Authority deciding if an appropriate software application is available in the market, and if a decision is made to procure the software or use of the software, the most appropriate method for acquiring the software or use of the software under the Authority's Procurement Policies. The Authority may, at its sole discretion, ask follow up questions of, or seek additional information from, one or more of the responding firms or teams.

In addition, the Authority will consider holding one-on-one meetings with some or all of the respondents following the submission of responses to this RFI if the Authority chooses to do so or the respondent requests the opportunity to participate in such a meeting. The purpose will be to allow for further discussion of the respondent's software application and how it addresses the needs and desires of the Authority as a tool to manage traffic congestion during construction of the MoPac Improvement Project and on other regional traffic corridors. While the Authority hopes to hold meetings with all respondents who request one, the Authority cannot, due to time and resource constraints, guarantee that all requests will be accommodated. It is anticipated that the meetings will be held during January, 2014.

If the Authority elects to procure software to manage traffic congestion, the Authority will follow the Procurement Policies it determines are appropriate for the procurement.

VII. COST OF RESPONSES

All costs directly or indirectly related to preparing a response to this RFI, including attendance at any meeting or oral presentation requested by the Authority, shall be the sole responsibility of, and shall be borne by, the respondent.

VIII. RELEASE OF INFORMATION AND OPEN RECORDS

All information submitted to the Authority in connection with this RFI, including any exhibits, correspondence, printed materials, or electronic or digital media is the property of the Authority and may be subject to public disclosure under the Texas Public Information Act ("PIA"). Any material deemed by a respondent to be proprietary, confidential, or otherwise exempt from disclosure under the PIA should be provided separately and clearly marked as such. The Authority will use reasonable efforts to notify a respondent if a request for public information is received that may require the Authority to disclose any material that the respondent has marked as proprietary, confidential, or otherwise exempt from disclosure under the PIA. The Authority is not obligated to assert or argue on behalf of the respondent that any information provided to the Authority is exempt from required disclosure and shall not be liable for the disclosure of any information submitted in connection with this RFI.

IX. OWNERSHIP OF RESPONSES

The Authority will retain all property rights, including publication rights and intellectual property rights, to any work product developed by respondents and provided to the Authority. Respondents must ensure that the Authority has duplication and distribution rights for all work products.

Metropia, Inc.

Response to Central Texas Regional Mobility Authority Request for Information (RFI) for Incentive-Based Traffic Congestion Management Software and Smartphone App

Exploration of Partnership for Metropia and CTRMA for MoPac Congestion Alleviation

Metropia, Inc.

2200 E. River Road, Suite 224

Tucson, Arizona 85718

Yi-Chang Chiu, Ph.D.,

President and CEO

yc.chiu@metropia.com

(O) 520-268-8067

(M) 520-481-9917

January 3, 2014

1 INTRODUCTION

Metropia, Inc. was created to help cities rethink and innovate mobility solutions for an entire region. It has been long recognized that simply adding capacity to cities will have limited success in the long term if not coupled with innovative demand management strategies.

The Austin metro area, including Travis and Williamson Counties, is one of the fastest-growing regions in the U.S. Further, The Central Texas Regional Mobility Authority (CTRMA) is recognized nationwide as a thought leader in proposing and implementing innovative, multi-modal transportation solutions that reduce congestion and create transportation choices that enhance quality of life and economic vitality for both Williams and Travis Counties.

As a result, one of the improvement priority corridors for the CTRMA is Loop 1 (see Figure 1) which is a freeway providing access to the west side of the U.S. city of Austin, Texas. It is also known as MoPac Expressway (or, according to some highway signs, MoPac Boulevard) after the Missouri Pacific Railroad.

According to Texas Transportation Institute, traffic congestion on MoPac has reached more than 127K Annual Average Daily Trips in 2013. The congested period lasts more than five hours daily, and the total annual cost of delay has grown to more than $64MM (Texas Transportation Institute 2013).

CTRMA, through its design-build contractor, has begun construction of the MoPac Improvement Project (the "Project"). The Project is approximately 11.9 miles in length, from just north of Parmer Lane (FM 734) south to Cesar Chavez Street. The Project includes two dynamically-priced tolled lanes (one lane in each direction) constructed along the inside median of the existing Loop 1 facility by widening pavement and bridges and, in some areas, reducing the width of the existing lanes and shoulders. Construction is anticipated to last through early 2016, during which time traffic congestion on Loop 1 is anticipated to greatly increase. An array of mitigation strategies needs to be implemented to keep the public informed and involved with the benefits of project for the duration of the build and afterwards.

Figure 1: MoPac (Loop 1)

Among all the possible applicable strategies, we believe that the Metropia© Mobile and Synergy platform, an innovation engineered by Metropia Inc., is the ideal solution to assist the CTRMA to:

1. Effectively mitigate the congestion resulting from MoPac construction
2. Allow CTRMA engineers to simulate the impact of work zones, events, emergencies, etc., and create pre-determined mitigation strategies. Further, these strategies are communicated to the driving public ahead of time and in real time to minimize congestion due to the changes.
3. Assist CTRMA with traffic management in the short term as well as the future by balancing traffic flow throughout the city and helping the Central Texas Region fully utilize available system capacity (and making the CTRMA a true Regional Solution Provider to the Austin Area).
4. Co-brand the Metropia Mobile app with the CTRMA.

Metropia uses advanced algorithms to determine which departure times and routes for specified destinations have available capacity, and offers varying levels of incentives for using less congested departure times and routes. Drivers use the app to reserve these clearer, faster routes, and when the recommended departure time gets close, the app reminds drivers when it's time to leave.

Metropia also works with local and national business partners to develop an incentive system used to incentivize drivers to change their route or departure time choices. The Metropia system keeps track of the number of drivers using alternative routes and departure times, and automatically adjusts incentive levels for recommended trips if too many **Metropia** drivers are attempting to use the same route. **Metropia** calculates the system optimal incentives and uses differing levels of incentives to drive users to utilize available capacity, thus balancing the traffic load of the system during recurrent rush hours or unexpected incident situations.

Through the Metropia Synergy Platform, the CTRMA and its partnering institutions can adjust the capacity of the roadway (Pre-planned or in real-time) due to changing conditions. These conditions can consist of a combination of lane reductions, closed ramps, contraflow, closed roadways, etc. which typically have a domino effect on the entire transportation system. The advanced algorithms in the Metropia Platform account for these changes, and re-routes the public to minimize regional congestion.

1.1 METROPIA – AVOID TRAFFIC, DRIVE SAFER, REWARD YOURSELF

Metropia is an innovative new mobile traffic app that uses advanced prediction and coordinating technology combined with user rewards to incentivize drivers to cooperate, balance traffic load on the network, and reduce traffic congestion. This new traffic prediction technology that eases roadway congestion by rewarding drivers for using alternate routes and times -- avoiding peak congested traffic -- launched in select U.S. cities in the fall of 2013.

The Metropia mobile traffic app offers the fastest, least congested routes available, and coordinates users to help shift the burden of solving city traffic congestion from expensive new highway construction to driver cooperation and collaboration. Drivers who use Metropia to make simple adjustments to the times they leave and the routes they use can significantly improve their commute times, and are collectively helping reduce the pollution and waste associated with daily traffic congestion.

Metropia users win: Drivers using Metropia's suggested alternate times and routes are avoiding major traffic congestion by removing themselves from the area or departing at a time when travel through the area is clear. Metropia users earn rewards points each time they use the app to take an alternate route, and these points can be applied to various rewards made available by the rewards program. Potential rewards include discounts and other special offers from stores, restaurants and other retail services, or drawings for gifts pledged by partnering manufacturers (e.g. iPad, electric cars, etc.), free parking vouchers, etc.

Everybody wins: All drivers commuting on their own also benefit from Metropia activity. When Metropia users change their behavior and contribute to the traffic congestion alleviation, the road becomes clearer and remaining drivers also benefit even if they don't use the app to change their departure time or routes.

Agency wins: Cost savings to the community. A system-level improvement like the one offered by Metropia, if implemented using traditional infrastructure-based solutions, would require hundreds of millions of dollars. Metropia costs merely a fraction of traditional methods. Further, the Agency is seen by the public as a progressive institution that is using sophisticated, useful technical tools to help solve traffic congestion, as opposed to simpler apps that require users to navigate congestion on their own, bringing little value to the traveling public.

The reality of traffic congestion is that there are only certain peak hours of traffic a day. The rest of the day, most freeways are underutilized. What is missing is a technology that incentivizes drivers to make better, alternate travel choices in route and departure times, to help spread traffic demand. The Metropia team uses mathematical algorithms and computer models to solve the traffic problem, then gives these improved,

faster trip alternatives to Metropia users. When users take these routes, they're helping reduce existing congestion, and also earning rewards points for their help.

Metropia is distinctly effective over existing mobile traffic apps because all other apps offer identical descriptive traffic information to all travelers. This is more likely to cause a "herding effect" – the term for an excessive amount of travelers taking the same action and congesting the same routes, simply shifting traffic congestion somewhere else. Research indicates that traffic congestion is reduced considerably when just 10% of drivers in the area are using the Metropia's alternate departure times and routes. Metropia's scientists and engineers also found that Metropia users can save up to 40% travel time during rush hours. Even non-Metropia users save time thanks to the action of Metropia users.

Drivers use the Metropia system for more than the rewards or their own benefit. They also use it because of its positive social cooperation aspects in solving a growing traffic congestion problem.

1.2 HOW METROPIA WORKS

Metropia uses advanced algorithms to determine which departure times and routes have available capacity, and offers higher levels of incentives for drivers who travel during least congested times and clearer routes. Metropia uses city-specific data to generate accurate alternative routes and times and predicted experienced travel time. Drivers use the app to reserve these faster routes, and when the recommended departure time gets close, the app reminds drivers when it's time to leave.

The Metropia system keeps track of the number of drivers using alternative routes and times, and automatically adjusts incentive levels for recommended trips if too many Metropia drivers are attempting to use the same alternate routes.

As shown in Figure 2, Metropia servers use both real-time and historical data to analyze (in space and time) where available capacity exists, whereby moving additional demand that will lead to overall reduction of travel time and congestion.

The Metropia server system then utilizes such information in conjunction with its sophisticated models to estimate the amount of reward points, or "mPoints," to be awarded for each departure time and route. If a departure and route is found be more beneficial to the entire system, and then a higher amount of mPoints are allocated to that departure time-route option. Metropia also provides predicted experienced travel time for future departure times. This accurate prediction[1] empowers a driver to decide to leave now or depart later, considering the onset of congestion. The mPoints incentive and travel time prediction is a powerful combination to motivate drivers to use a less congested route and time. A driver will then make a reservation for a specific route and departure time (Step 1).

Ten minutes prior to the reserved departure time and route, the GPS will turn on and a reminder will pop up to remind the driver that it's time to leave. A certain time buffer is allowed so that the driver can leave within a certain time window. Once the trip is started, Metropia becomes a navigation app that provides audio turn-by-turn navigation guidance to assist the user in following the reserved route until reaching the final destination. There are other internal rules that allow for a certain grace period and distance buffer, so that the user will be awarded with the reserved mPoints when the majority of the route being followed is completed (Step 2).

[1] Extensive field testing shows that the prediction error for Metropia is at a mere 15%, much less compared to two other major navigation tools at 30% and 40% respectively.

A user can continue Steps 1 and 2 in order to continue accumulating mPoints. The earned mPoints can then be redeemed for various discounted products and services, freebies, lotteries, or even donated to charities (Step 3).

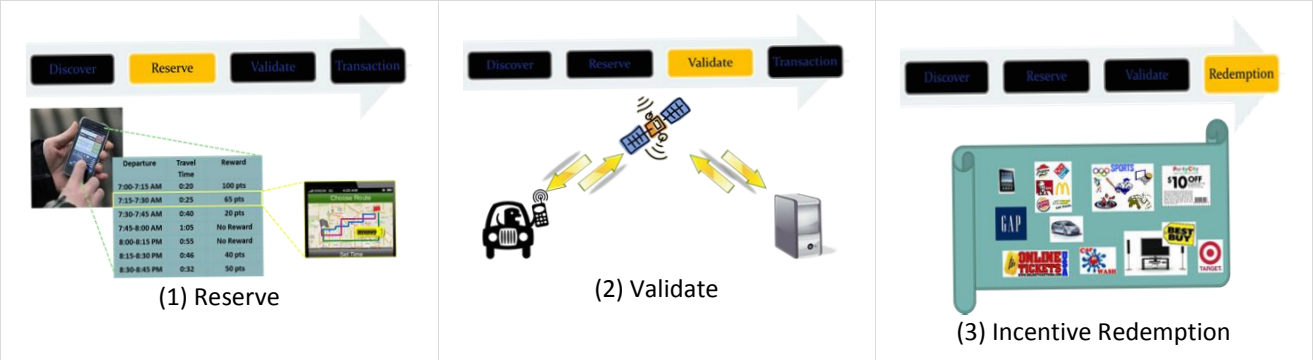


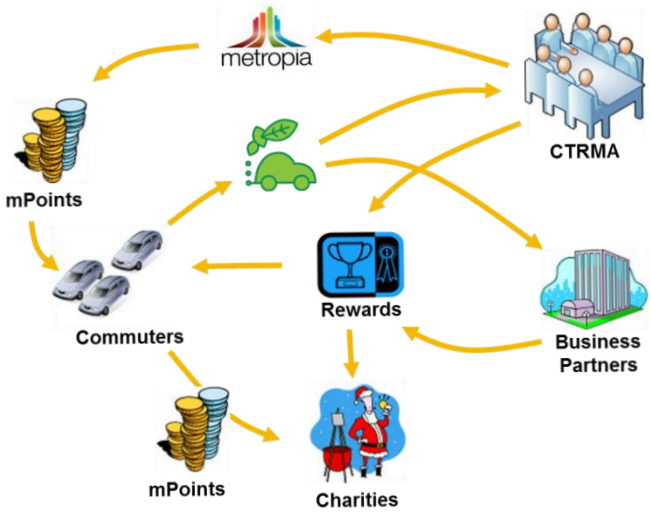
Figure 2: Metropia User Experience

When users validate their reserved trips, the Metropia app retrieves the user's real time information such as location, speed, and acceleration/deceleration from the GPS module embedded in the smartphone, and sends it to the cloud server, where the user profile and traffic data are stored as well. Users can access their personal dashboard using their mobile device or computer, where their performance, achievement information and other personalized information is available. The detailed data stored in the cloud also provides the feasibility for many other related applications: the detailed user trajectory data can be used for real-time traffic estimation and prediction, the historical traffic database can support historical traffic pattern analysis, real time traffic information can be applied in traffic monitoring and management, while the traffic prediction module and the incentive-based reservation/validation platform can be used for active demand management and active traffic management purposes.

1.3 CREATING AND SUSTAINING THE METROPIA ECOSYSTEM

The Metropia team aspires to facilitate the creation and sustainment of the Metropia Ecosystem, a system in which all the participating entities not only contribute to the improvement and sustainability of urban mobility, but also benefit from their participation in the ecosystem. This vision is a paradigm shift from the traditional framework in which the transportation agencies carry most the responsibility for mobility improvement, with commuters and corporate entities demanding congestion improvement while omitting the fact that they are also part of congestion problems.

In the Metropia Ecosystem, all entities actively participate in congestion alleviation and consequently benefit from participation. Transportation agencies sponsor and jump start the initial formation of the ecosystem, providing initial incentives and promoting the technology and ecosystem to the commuter and business communities, consequently accelerating user adoption. With this higher user adoption, viable marketing opportunities exist for the corporate sponsors and merchants/vendors to participate. Corporate sponsors and merchants participate in this ecosystem by way of providing incentives such as discounted products or services. Employers



participate in this ecosystem by promoting the technology to their employees, resulting in more flexible and robust commuting options, happier employees and greater fulfillment of corporate social responsibility. Finally, the commuters who are willing make the effort to adjust their departure time and route by accepting Metropia recommendations have access to various types of rewards provided by agencies and corporate sponsors (see Table 1).

Commuters redeem the earned points as well as discounted products. While commuters enjoy cheaper services and products, the participating merchants also enjoy increased patronage. Further, the participating agency benefits from a more cost-effective solution, robust region-wide mobility, and broader community support.

Table 1: Metropia Ecosystem Participating Entity Contribution and Benefit

Entities	Contribution	Benefit
Agency	Fund program jump-start, initial program marketing and promotion	Cost-effective and robust region-wide mobility, active roadway capacity management via Metropia Synergy Platform; broader community support
Commuter	Adjust departure time and route	Better and safer travel, a sense of contributing to the community and environment, discounted services and products
Employer	Encourage employee participation	Fulfilment of corporate social responsibility
Merchant/Vendor	Provide discounted service and products	Increase patronage and revenue.

2 RESPONSES TO CTRMA RFI QUESTIONS

2.1 A. GENERAL INFORMATION

2.1.1 AN OVERVIEW OF THE ENTITY PROVIDING THE SOFTWARE APPLICATION AND THE NAME AND CONTACT INFORMATION (MAILING AND EMAIL ADDRESSES; TELEPHONE NUMBERS) FOR THE PRINCIPAL CONTACT FOR THAT ENTITY.

Metropia, Inc. was founded by University of Arizona Professor Yi-Chang Chiu, the inventor of Metropia technology (yc.chiu@metropia.com, 520-268-8067). Metropia is the mobile app system that rewards commuters for choosing better departure times and/or routes to help reduce and eliminate traffic congestion. The Metropia system is one of several technology products in development at Metropia.

Other products currently in deployment or development by Metropia include Metropia Synergy, the city mobility platform for traffic planners and operations engineers, fleet managers, campus planners, emergency planning and more; and Metropia Synergy for Universities, the multi-modal platform that strategically manages campus accessibility using the Metropia mobile application. Metropia currently has products deployed or ready for deployment in the cities of Los Angeles, Phoenix, El Paso and Austin, Texas.

Metropia develops and integrates high-performance and mobile computing technologies to produce apps and backend server systems that help both users (commuters) and entire systems (cities) during normal operations, preplanned special events, or unexpected, extraordinary circumstances. Metropia is composed of a group of transportation engineers, network modelers and computer scientists, all with solid academic

backgrounds and practical experience, and a passion for solving urban traffic congestion problems with creative and innovative cutting-edge solutions. The mailing address for Metropia Inc. is 2200 E. River Road, Suite 224, Tucson, AZ, 85718.

2.1.2 A BRIEF SUMMARY OF THE ENTITY'S EXPERIENCE IN DEVELOPING AND IMPLEMENTING TRAFFIC CONGESTION MANAGEMENT SOFTWARE

The Metropia team was established in 2010 and incorporated as Metropia Inc. in 2012. The technology was developed at the University of Arizona and is the sole licensee of the patent pending technology.

Although the company is relative young, the executive team has a proven track record of producing traffic congestion management software for over 15 years. One of the world-renown traffic congestion management software tools developed by the Metropia team, particularly Dr. Yi-Chang Chiu, is the Simulation-Based Dynamic Traffic Assignment (DTA) model called DynusT (Chiu and Nava 2013). Since its debut in 2002, DynusT has the capability of simulating the daily activities of millions of vehicles within any metropolitan area in the United States. Partially funded by Federal Highway Administration and National Science Foundation, since the debut of the official DynusT website in 2011, more than 1,000 copies of DynusT have been downloaded by transportation professionals from more than 25 countries around the world. DynusT has also been used by the Texas Transportation Institute to simulate traffic conditions for the year 2035 in the CAMPO region, with the focus of alleviating future traffic congestion on IH-35, and from which a number of traffic management strategies were recommended (Shelton, Lorenzini et al. 2013).

Qualifications of the Metropia team are briefly described below.

	**Yi-Chang Chiu, Ph.D. (Transportation Eng., UT-Austin, 2002), Founder and President** Dr. Chiu is currently an Associate Professor at the Department of Civil Engineering and Engineering Mechanics at the University of Arizona (UA) and President of Metropia, Inc. Dr. Chiu is a renowned researcher and innovator in the area of Intelligent Transportation Systems (ITS) and incentive-based active demand management, and the principal developer and consultant to FHWA.
	**Jenda Chen, MBA, PMP, Co-Founder and COO** Mr. Jenda Chen has over 15 years of global cross-functional management experience in Acer America prior to joining Metropia Inc. At Metropia, Mr. Chen is responsible for developing and cascading the organization's strategy/mission, ensuring efficient and effective business operations, and marshaling limited resources to the most productive uses with the aim of creating maximum value and strategic planning for the company's stakeholders.
	**Jorge A. Villalobos, Ph.D. (Transportation Eng. Univ. of Arizona 2012), Co-Founder and Board of Directors** Dr. Jorge Villalobos has 10 years of transportation engineering and over 16 years of operations experience in Fleet Management, Asset Management and Operations. Dr. Villalobos is currently a Director on the Board of Directors for Metropia and works as the General Manager of Operations for Shell Wind Energy. His current role is leading Metropia's business development efforts, operational planning and investor relations.

	**Xianbiao Hu, Ph.D. (Transportation Eng., Univ. of Arizona, 2013), Director of Research and Development** Dr. Hu is an experienced researcher and engineer in the field of transportation engineering, with research focuses in the areas of Active Traffic Demand Management (ATDM), Advanced Traveler Information Systems (ATIS), Intelligent Transportation Systems (ITS), Dynamic Traffic Assignment (DTA), network modeling and simulation. Prior to joining Metropia Inc., Dr. Hu was the core research engineer for Trafficcast China, leading traffic prediction, incident detection and real time Origin-Demand (OD) demand estimation based on the cell phone signal and GPS data.
	**Mario Salomon, BS, MS – EE/SIE, Lead Operations Engineer** Mr. Salomon has strong experience in directing sustainability and transportation projects, including a Student Government Association (SGA) funded Green Fund project to engineer and approve a new Wide-Area Student Busing system, the development and deployment of a campus recycling system, and a UTEP Bike-Share System in collaboration with City of El Paso and the Metropolitan Planning Organization.
	**Ruijun (Ray) Luo, BS, CS, MBA, Director of Software Engineering** Mr. Ruijun (Ray) Luo has 14 years of in-depth experience in the software industry, taking part in software development, customer support, pre-sale support to build telecom-scale distributed systems to sustain millions of users. At Metropia, Mr. Luo is responsible for designing the architecture of the IT system, leading a team to implement and optimize its components, and also maintaining the infrastructure in a cost-efficient way.
	**Paul Hoffer, BS, MS SE/CE** Paul Hoffer is the Metropia's Program Imagineer with over three years of experience working with Bluetooth traffic detection technology in the Intelligent Transportation Systems industry. He also has several years' experience in working with the DynuStudio and DynusT software tools, as well as programming experience in Ruby/Python/PHP.

2.1.3 A SHORT DESCRIPTION OF THE LOCATION, HISTORY, AND RESULTS FROM ACTUAL IMPLEMENTATIONS OF THE SOFTWARE, INCLUDING THE NAME AND CONTACT INFORMATION FOR ONE OR MORE INDIVIDUALS ASSOCIATED WITH THE AGENCY OR CUSTOMER WHO ACQUIRED AND IMPLEMENTED THE SOFTWARE APPLICATION WHO CAN BE CONTACTED AS A REFERENCE.

Metropia initiated a 10-week pilot study in April 2013 in Los Angeles, California, with the main objective to test the performance of the ATDM system and validate incentive-based demand management ideas and travel time saving performance. Incentives such as gift cards and raffle awards were provided as an extrinsic motivation to encourage drivers' behavior change. While monetary incentives could encourage the use of a product, it is the product's ability to deliver what users expect and thus provide an intrinsic motivation for its continuing use. As such, the pilot study focused on two aspects of Metropia:

1. Metropia's capability to accurately predict traffic conditions ahead of time, so as to intelligently determine the best route and departure time choice from an origin to a destination within the user departure time window; and

2. Metropia's travel time savings given that users are willing to change their departure time, habitual route, or both.

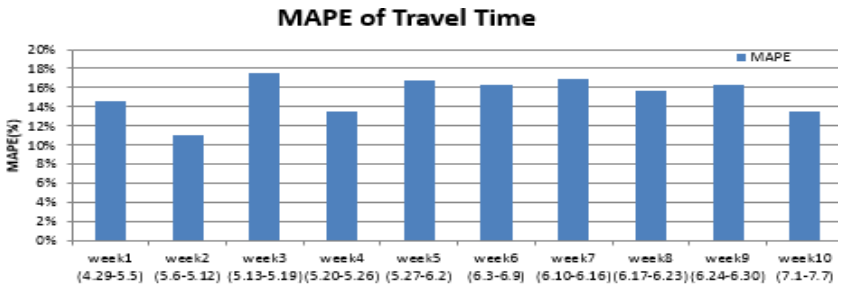


Figure 3: MAPE of travel time across the pilot field study period

Figure 3 shows the temporal changes of Mean Absolute Percentage Error (MAPE) across the pilot study period, from which it can be observed that the weekly average system error varied between 10% and 18%. For the entire pilot study period, the overall Metropia MAPE was 15.20%, significantly lower when compared to MAPEs based on estimated travel times from two other major navigation tools in the market (around 30% and 40%, respectively).[2]

In addition to comparing predicted and experienced user travel time, the degree of behavioral change was analyzed by comparing the user's trip decision based on Metropia with the user's normal travel behavior in terms of departure time and route choice. Based on the pilot study, it was observed that users changed departure time for as many as 60% of the trips, changed route for as many as 51% trips, and changed both departure time and route choice for many as 35% of the trips.

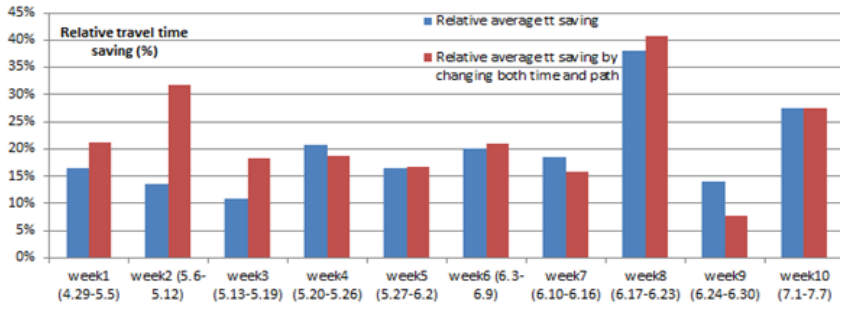


Figure 4: Weekly relative average travel time savings

Figure 4 illustrates the relative travel time savings by week 10 of the pilot study, with blue bars representing relative average travel savings for all validated trips using Metropia, and red bars representing travel time savings for trips that users changed both departure time and route. In general, travel time savings range from 10% to 40%, with highest savings occurring when users changed both their departure time and route.

In addition, the following specific observations can be made:

- Metropia users who changed their departure time only, but stayed on the same route, reduced their travel time by 19.40% on average
- Metropia users who changed their route only, but departed at the same time, reduced their travel time by 10.0%
- Metropia users who changed both departure time and route reduced their travel time by 20.12%
- Metropia users who departed earlier than they used to reduced their travel time by 22.13%
- Metropia users who departed later than they used to reduced their travel time by 19.32%
- The average travel time for commuter trips in the morning was reduced by 20.58%
- The average travel time for commuter trips in the evening was reduced by 16.87%

[2] Mean Absolute Percentage Error (MAPE), also known as absolute percentage deviation (MAPD), is calculated by $1/n * \sum (|\text{Experienced travel time} - \text{Predicted travel time}|/\text{Experienced travel time})$

The contacts for the Los Angeles pilot study include Selwyn Hollins, Assistant General Manager, Operations, selwyn.hollins@lacity.org and Michael Shimokochi, Information Systems Manager, michael.shimokochi@lacity.org

2.2 B. SOFTWARE APPLICATION: PLEASE PROVIDE THE FOLLOWING INFORMATION CONCERNING THE TRAFFIC CONGESTION MANAGEMENT SOFTWARE APPLICATION YOUR ENTITY OFFERS.

2.2.1 PROVIDE THE PRODUCT NAME, INITIAL RELEASE DATE, AND ALL SUBSEQUENT UPDATES AND RELEASES OF THE SOFTWARE APPLICATION AND RELATED SMARTPHONE APPLICATION.

Product name: Metropia Mobile and Metropia Synergy (aka Smartrek Mobile)

Pilot Test Release: January 2013

Official Release: October 26, 2013

Patch/update schedule: bug fixes - every two weeks; feature enhancement, every month.

Next major release is scheduled for mid-January 2014 and will include:

- Re-branding - re-brand Smartrek Mobile to Metropia as the new product name.
- Improved user experience - simpler trip reservation process, interactive map, SessionM – mPoints integration, enhanced navigation features.

2.2.2 IDENTIFY EACH MOBILE OPERATING SYSTEM (IOS, ANDROID, WINDOWS, ETC.) FOR WHICH THERE IS AN EXISTING MOBILE APPLICATION; AND THE PROJECTED RELEASE DATE FOR ANY MOBILE APPLICATION PLANNED FOR RELEASE ON OR BEFORE AUGUST 1, 2014.

The Metropia Mobile app is currently available in both iOS and Android platforms. Currently there is no plan to extend the platform to Windows in the near future.

2.2.3 DESCRIBE WHETHER, AND IF SO HOW, THE SOFTWARE IDENTIFIES EXISTING TRAFFIC CONGESTION AND PREDICTS NEAR-TERM FUTURE CONGESTION BY USING REAL-TIME TRAFFIC DATA. DESCRIBE ALL SOURCES OF REAL-TIME TRAFFIC DATA USED BY THE APPLICATION TO IDENTIFY AND PREDICT CONGESTION.

The Metropia system identifies existing traffic congestion and predicts near-term future congestion by using real-time traffic data via sophisticated and flexible data fusion techniques and traffic engineering methodologies. The Metropia system deployment employs a MUST (Multi-Stage Transcorrelation) framework that fuses and combines multiple types of data from multiple data sources in a flexible fashion that can accommodate varying quality and availability of these data. At the initial stage, Metropia accesses a real-time data server and pulls real-time data at a 5 minute interval. Data fusion methods are subsequently initiated in order to predict future traffic condition. In case of real-time incidents and/or pre-planned capacity modifications, a special event prediction engine kicks in to provide localized updates of traffic condition around the impact area. Specialized routing algorithms are used to provide real-time congestion-

responsive routes to drivers. All the designs aim to provide accurate travel time prediction and routing under both routine and incident situations.

2.2.4 DOES THE SOFTWARE HAVE THE CAPABILITY TO PUSH SPECIFIC INFORMATION PROVIDED BY THE SPONSORING ENTITY TO MOBILE USERS, SUCH AS CONSTRUCTION WORK SCHEDULES AND WORK ZONES, LOCATION OF TRAFFIC ACCIDENTS OR ROAD BLOCKAGES, OR OTHER INFORMATION THAT MAY HAVE AN IMPACT ON SUGGESTED ROUTES PROVIDED BY THE SOFTWARE? IF SO, PLEASE BRIEFLY DESCRIBE THE PROCESS AND REQUIREMENTS FOR PUSHING INFORMATION TO MOBILE USERS.

Metropia is able to send out push notifications to users based on various criteria defined by the System Operator. Information like construction work schedules, work zone, location of traffic accidents, or load blockage can be optimally managed and disseminated via the Metropia Synergy Platform. Metropia Synergy is essentially the TMC (Traffic Management Center) -ready platform that allows seamless communication between the System Operator and the users. As shown in Figure 5, Metropia Synergy keeps track of both preplanned and unexpected events. The information is fed into the Capacity Planner that allows the Operator to either pre-plan the upcoming work zone or closure event, or to synchronize the network capacity change with real-world implementation. For example, in time of a major crash event, the DPS officers may need to close certain on-ramps. Such information can be fed into the Capacity Planner in real-time so that the adjusted network capacity can be reflected in the real-time Metropia routing engine. Examples of Metropia Synergy can be found in the following YouTube videos:

Congestion Analytics: http://youtu.be/kvWVipyQHXc

Regional Flow Modeling: http://youtu.be/OqlPyj8MOrA

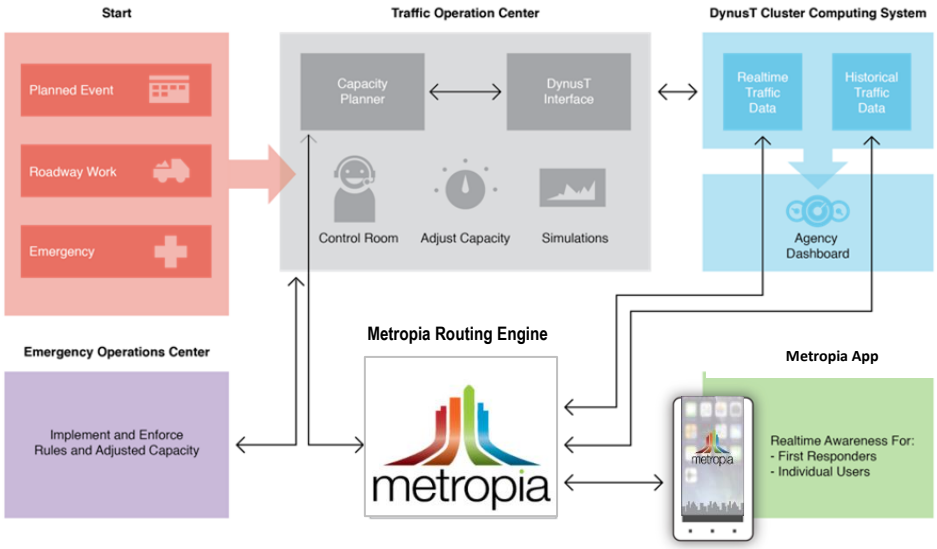


Figure 5: Metropia Synergy System Architecture

Figure 6 provides an example of Metropia showing push notification to users.

2.2.5 CAN INFORMATION BE PUSHED TO SUB-SETS OF MOBILE USERS, BASED ON SPECIFIC CRITERIA (FOR EXAMPLE, CURRENT LOCATION OF THE SMARTPHONE)? IF SO, PLEASE DESCRIBE THE CAPABILITIES TO TARGET A SUB-SET OF MOBILE USERS TO RECEIVE A PUSH OF INFORMATION BY SPECIFIC CRITERIA.

Metropia's ability to push information to a sub-set of users is flexible and configurable. Depending on the needs of the sponsoring agency, the rules and criteria as well as conditions for information dissemination is entirely programmable. Once Metropia engineers fully understand the specifications for this type of communication, they can update the rules and criteria at any time. For example, if work zone or incident information needs to reach those commuters traversing MoPac, Metropia can push such information selectively to only MoPac users. The same strategy can be extended to different facilities under CTRMA's jurisdiction. To complete the process, Metropia engineers and CTRMA staff will need to jointly define details pertaining to such communications.

Figure 6: Metropia Notification Screen – Pre-trip

2.2.6 DESCRIBE ANY INCENTIVES OFFERED THOUGH THE MOBILE APPLICATION FOR DRIVERS TO CHANGE THEIR BEHAVIOR IN A WAY THAT REDUCES TRAFFIC CONGESTION, SUCH AS CHANGING THE TIME OR ROUTING OF A TRIP.

Metropia offers various types of incentives that can be integrated in a flexible manner that meets the goals and needs of the sponsoring agency. The incentive program rollout process is gradual and progressive, aiming to balance the efficacy and resource requirements at different phases of the deployment. The following briefly discusses the phased incentive program development followed by the explanations of individual reward types.

Phase I – Phase I refers to the initial roll out and jump-start of the program. In this initial phase, user uptake is anticipated to be low and the incentive program goal is to provide tangible and substantial rewards provided by the agency and Metropia. The intrinsic reward includes weekly summaries of user personal gain and societal contribution for being part of the Metropia solution. Metropia has also partnered with SessionM and the mPoints system that allows users to immediately start collecting points and redeeming them for rewards.

Phase II – It is anticipated that through the partnership with the sponsoring agency and active marketing and promotional campaigns that user uptake starts to accelerate in Phase II. During this period, the incentive providers will continue to be expanded to local corporate sponsors and merchants.

Phase III – In Phase III user uptake gradually reaches maturity, and therefore the goal of the incentive program is to sustain its program offering by setting up a long-term sustainable relationship with corporate and merchant sponsors.

	Phase I	Phase II	Phase III
User uptake	Low	Accelerating	Mature
Incentive Program Goal	Jump start	Expand	Sustain
Incentive types	Agency Reward mPoint Reward Intrinsic Reward	Agency/Corporate/Merchant Reward mPoint Reward Intrinsic Reward	Agency/Corporate/Merchant Reward mPoint Reward Intrinsic/Charity

Figure 7: Metropia Three-Phase Incentive Program Roll-out

As mentioned in the preceding section, it is our vision that in the Metropia Ecosystem, the agency will not be the sole incentive provider and commuters may not be the sole incentive recipients. The mutually beneficial and responsible relationships need to be established through a carefully designed process. This ecosystem also needs to have a financially sustainable business model in order to sustain and prosper without perpetual significant subsidy. The aforementioned various types of rewards are further explained as follows:

- Agency Reward

As shown in the recent studies, it is rather common and effective for the sponsoring agency to provide a limited amount of incentives for a specified amount of time during the initial roll-out period. Examples of such practices include:

* In Melbourne, Australia, an early bird ticket program was proposed to alleviate the rail overcrowding issue during peak hours. Free rail fares were provided for rail travelers by the transit agency if the travelers complete their trips before 7:00 a.m. as incentives to shift demand from the peak to relieve the overcrowding problem (Currie 2011).

* In a 13-week field study conducted in The Netherlands, 340 participants were provided with daily rewards by the transportation agency -- monetary and in-kind --in the second half of 2006, in order to encourage them to avoid driving during the morning rush-hour (Ben-Elia, Boeije et al. 2011; Ben-Elia and Ettema 2011).

* In the U.S., Stanford University also used the idea of incentives to manage their campus parking problems, through Dynamic Parking Pricing (Stanford University 2012).

The agency reward is the affirmative representation of the agency's leadership in the jump-starting of the Metropia Ecosystem. The agency can identify types of incentives that are at no or minimal cost to the agency, and such rewards could be identified through examining agency assets and identifying the availability of cost-effective assets to offer.

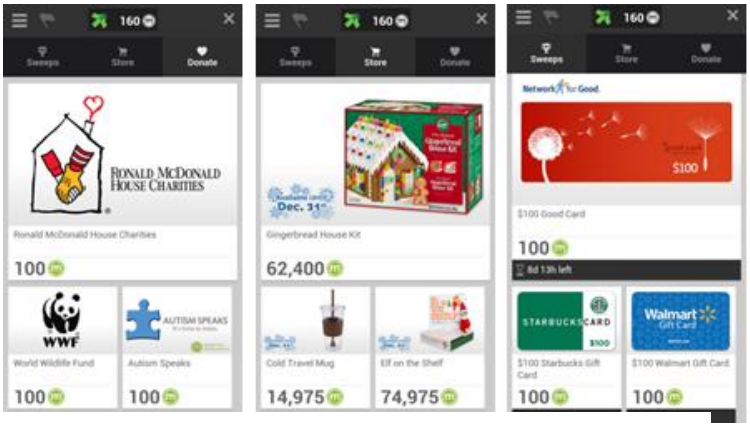


Figure 8: Donate, Store, and Sweep options for mPoints

- mPoints

Metropia Inc. currently has partnered with SessionM Inc. allowing Metropia to provide mPoints rewards for drivers using Metropia. The mPoint system is a universal point system provided by SessionM.

The mPoints reward platform allows a Metropia user to redeem earned points (160 points are shown in Figure 8) for various offering categories such as Sweeps, Donate and Store. This opens the use of earned points from Metropia to a wide range of rewards. It is noteworthy that there is a daily limit of mPoints given out to users, and such a limit equates to only a small amount of monetary value. mPoints is a supplementary reward system and may not be sufficient as a stand-alone reward program. Other complementary reward programs from other entities are needed. Nonetheless, mPoints deliver instant rewards and a "fun" factor into the overall user experience. It has also an "opt-out" option, allowing a user to disable this feature if a user wishes to do so.

- Merchant Reward

Metropia Inc. has developed a merchant program that allows local business, regional or national franchises to participate by providing time-sensitive coupons to be delivered to Metropia users. Merchants can design and implement campaigns consisting of different types of coupons such as dollar off, % discount or special deals. Merchants participating in this program will have their offered coupons or deals presented to commuters at the time when they are making trip reservations. The offers are carefully presented so that only merchants adjacent to the usual route chosen by the commuters are pushed. Time-sensitive offers can also be presented to users, allowing merchants to be able to effectively reach their potential customers and, as a result, be able to realize reasonable ROIs and be willing to continue participation in the program.

- Corporate Sponsors

Once a substantial number of commuters use Metropia regularly, marketing opportunities exist to attract corporate sponsors to participate through sponsorship. An example is for an oil company to sponsor a number of gas cards to the Metropia users and earn premier sponsorship status with the agency and Metropia.

- Intrinsic Reward

From our prior field testing, we found that commuters can be motivated and feel rewarded in many different ways, part of which is to feel they are making a positive impact to both themselves and to the community, city, and the Earth. The Metropia team delivers highly sophisticated performance measurements based on a set of performance metrics to agencies, commuters, employer sponsors, and merchants. For commuters, we are able to measure and estimate metrics from travel time savings to environmental benefits. Similar metrics aggregated by different criteria can be reported to all participating entities, providing a clear and direct realization of the extent of greater good that the participating entities are making by using Metropia. Using sponsoring agencies as an example, Metropia is able to report performance metrics by region, by corridor, by city, or county or even neighborhood.

- Charity Donations

The Metropia team will also seek collaborations with local charity organizations to allow Metropia users to donate their earned points and rewards to charity organizations, allowing users to do something good for themselves and for their local communities.

2.2.7 DESCRIBE ANY CONTROLS OR RESTRICTIONS THAT CAN BE ESTABLISHED BY THE SPONSORING ENTITY TO MANAGE AVAILABLE ROUTES OR TIMING INFORMATION AND THE INCENTIVES OFFERED THROUGH THE SOFTWARE PROGRAM.

Extending from the Section 2.2.4 discussions, the Metropia Synergy system includes a Synergy Operator Console (SyCon) like the one shown in Figure 9. SyCon is a Windows™ based system that communicates with Metropia Synergy backend system in real time. SyCon uses the real-time traffic data from Metropia Synergy and by using the Metropia Traffic Simulator can predict three hours ahead of present time and two hours past the present time, so that the Operator can review both the past and future predicted traffic conditions within several minutes.

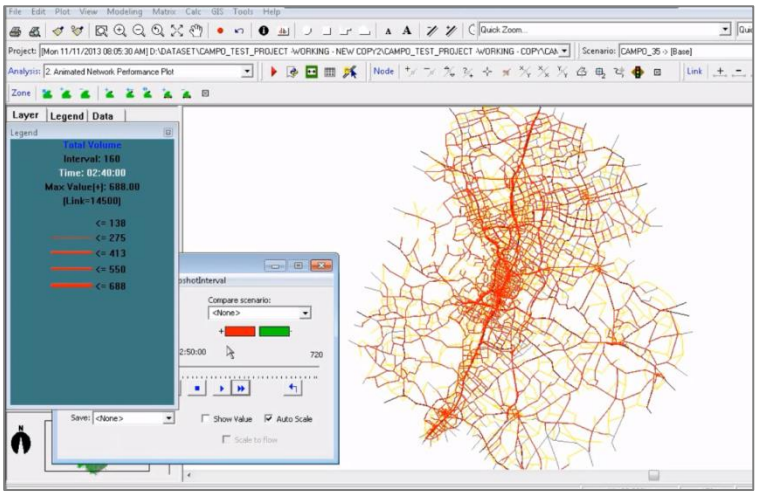


Figure 9: Metropia Synergy Platform Operator Console

More importantly, SyCon allows the Operator to perform various network operations such as capacity reduction due to work zone, roadway closure due to work zone or incident, intersection detour due to traffic control measures, in real time or weeks in advance, after pre-planning and simulation exercises have been complete.

Once such operations are set in place by the Operator, the Metropia Routing Engine will reflect such changes in the recommended routes, preventing users from traversing into the already closed or capacity reduced roadway sections. The Operator also has the ability to implement certain "impedance" for traversing a certain area during certain times, resulting in less traffic being routed through the said area. However, it is highly advised that the Operator perform such an operation with caution as to not create untended congestion or issues somewhere else. The use of the Metropia Traffic Simulator is recommended to ensure unintended consequences of the change are minimal.

2.2.8 DESCRIBE ANY FEATURES OF THE SOFTWARE PROGRAM OR SMARTPHONE APPLICATION THAT HAVE NOT ALREADY BEEN ADDRESSED (EXISTING OR PLANNED FOR RELEASE ON OR BEFORE AUGUST 1, 2014) THAT INCREASE ITS VALUE AS A REGIONAL TRAFFIC MANAGEMENT SOLUTION.

The Metropia team continues to improve the features and functions of Metropia App and Synergy System. Four major planned features that are relevant to this RFI include:

1. Multi-Route options: through collaboration with the sponsoring agency, Metropia is able to provide a free and an Express Lane route simultaneously. This optional feature is likely to help commuters fully realize the value of Express Lanes and increase the willingness to enter the Express Lanes and reduce the remorse. This makes the benefit of the Express Lane more transparent and better received, and allows users make a more informed decision based on their trip purposes and needs.
2. Enhanced incident management capabilities. Through partnership with the sponsoring agency, the Metropia system aims to better integrate and coordinate with regional transportation agencies such as the City of Austin and TxDOT, so that the Metropia Synergy backend system is better aware of the traffic management actions implemented by other agencies on the field. This improved situational awareness will improve the accuracy of travel time prediction and routing.
3. Multi-modal capability – Metropia is envisioned to ultimately become a multi-modal mobility management platform and App that provides expanded commuting choices to the traveling public, allowing CTRMA to provide comprehensive and robust mobility choices for constituents. It is anticipated that the Biking mode will be made available by summer 2014 and the transit mode

option will be made available by the end of 2014. Expanded and targeted incentives may be provided for those who give up driving and take other modes from time to time.

4. Collaboration with other mobility service providers – Metropia system can help those who not only drive alone but also carpool or rideshare. Recognizing the increased need and interest in ridesharing and carpooling, Metropia will actively seek opportunities with CTRMA and other service providers to explore synergistic collaboration.

2.2.9 DESCRIBE THE GENERAL TERMS OF AGREEMENTS BETWEEN ENTITIES SUPPLYING INCENTIVES OR REWARDS AND YOUR ENTITY AND/OR THE SPONSORING ENTITY.

The followings provide high-level descriptions for general terms of agreement but further implementation details remain negotiable with CTRMA.

1. If CTRMA decides to provide a certain type and amount of incentive for selected users, Metropia will collaborate with CTRMA to determine the conditions and criteria by which the incentive/reward are given to those who meet the award criteria. Metropia serves as the incentive/reward delivering agent on behalf of CTRMA. Metropia will regularly report to CTRMA the status of the incentive delivery and the performance metrics related to the incentive program.
2. All the reward/incentives provided by the 3rd party such as corporations, merchant sponsors, or employers, are managed through a separate agreement Metropia signs with the participating parties. The agreements clearly state the terms and conditions. Per the agreement the 3rd party sponsors will be properly credited and recognized for being part of the Metropia Ecosystem. No direct relationship will be established between the 3rd party sponsors and CTRMA.
3. Metropia does anticipate that CTRMA assists in jointly marketing and promoting Metropia technology to potential incentive/reward providers. However, once a 3rd party entity decides to become an incentive/reward provider, Metropia will remain the primary entity signing the agreement with these 3rd party partners.
4. Metropia's relationship with SessionM's mPoint system remains strictly between Metropia and SessionM and not CTRMA.

3 REFERENCES

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