

Multi-Modal Trip Planning System: Northeastern Illinois Regional Transportation Authority Final Report

JANUARY 2013

FTA Report No. 0033
Federal Transit Administration

PREPARED BY

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Regional Transportation Authority

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Metric Conversion Table

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft³	cubic feet	0.028	cubic meters	m ³
yd³	cubic yards	0.765	cubic meters	m ³
NOTE: volumes greater than 1000 L shall be shown in m ³				
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
TEMPERATURE (exact degrees)				
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C

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13. ABSTRACT This report evaluates the Multi-Modal Trip Planner System (MMTPS) implemented by the Northeastern Illinois Regional Transportation Authority (RTA) against the specific functional objectives enumerated by the Federal Transit Administration (FTA) in its Request for Proposals (RFP). The report considers a qualitative examination of how each function was implemented and also looks at user satisfaction and perception of individual features.			
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FOREWORD

In 2004, the Federal Transit Administration (FTA) entered into a Cooperative Agreement with the Northeastern Illinois Regional Transportation Authority (RTA) to develop and operationally test a Multi-Modal Trip Planning System (MMTPS.) This report seeks to evaluate the MMTPS from the perspective of the (RTA) and in the context of the original objectives for the project as envisioned by FTA.

Readers of this report can access the MMTPS directly at www.goroo.com.

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The authors would like to acknowledge the executive leadership and the directors of the Regional Transportation Authority for their support of this program. The authors would also like to thank the regional services boards of Chicago Transit Authority (CTA), Metra, and Pace for their participation and support.

This project benefitted from the support and guidance of FTA, particularly Charlene Wilder for her continued involvement over the long duration of this Cooperative Agreement.

Finally, the authors wish to thank the customers of RTA and users of the MMTPS system for their valuable feedback and suggestions, which have helped to improve and enhance the MMTPS.

ABSTRACT

In 2004, the Federal Transit Administration (FTA) entered into a Cooperative Agreement with the Northeastern Illinois Regional Transportation Authority (RTA) to develop and operationally test a Multi-Modal Trip Planning System (MMTPS). The Cooperative Agreement set forth a number of functional objectives for the MMTPS as a system that would provide door-to-door travel options with transit treated as “a single system regardless of how many separate agencies provide service for a given trip.” This report evaluates the MMTPS against the specific functional objectives enumerated in the FTA’s original Request for Proposal (RFP). The report considers a qualitative examination of how each function was implemented and also looks at user satisfaction and perception of individual features. The MMTPS, as implemented, achieved almost all of the FTA’s functional objectives. The report describes the rationale for the exclusion of the remaining objectives.

FTA also envisioned that the MMTPS would have a positive effect on ridership in the region and would lower costs per passenger mile. While the report was unable to conclusively find an observable relationship between availability of the system and ridership, it does present statistics and evidence to demonstrate the theoretical effects that the system has on ridership and cost reduction. The MMTPS is the only option in the region that fulfills the entire functional goal of a region-wide multi-

modal trip planner. However, this report compares the MMTPS against one other market alternative that achieves a subset of FTA's original goals.

FTA further envisioned that Intelligent Transportation Systems (ITS) standards would be used by the MMTPS for data exchange between system components. This objective was not met by the project. This report provides a brief overview of a separate RTA white paper that describes the justification for deviating from the envisioned standards.

Finally, the report looks at the usage of the MMTPS system in the region it serves and examines the limited marketing activity used to achieve this level of market penetration.

EXECUTIVE SUMMARY

The original Multi-Modal Trip Planning System (MMTPS) Cooperative Agreement conceived by the Federal Transit Administration (FTA) in 2004 was awarded to the Northeastern Illinois Regional Transportation Authority (RTA) at the end of that same year. RTA is the third-largest public transportation system in North America, providing more than two million rides per day. RTA's system covers 7,200 route miles in the 6-county region that includes the greater Chicago metropolitan area and covers a population of more than 8 million. RTA serves as a financial and budgetary oversight agency for three separate public transit agencies in the region: CTA, Metra, and Pace. RTA fulfills a regional planning role and sometimes initiates regional technology initiatives such as the MMTPS.

The Cooperative Agreement between FTA and RTA embodied nine separate functional objectives for developing a door-to-door MMTPS. The agreement also had objectives for the use of standards as a key part of the system implementation. The agreement envisioned two additional outcome objectives for the system that hypothetically would increase ridership and help reduce costs per passenger mile. This report primarily evaluates the MMTPS project on the basis of the objectives set forth in the original Cooperative Agreement. The following table summarizes the outcome of each objective:

Table ES-1

Objectives of Envisioned MMTPS System and Their Outcomes

Objective of Envisioned MMTPS System	Type of Objective	Outcome
Provides door-to-door travel options with transit treated as a single system regardless of how many separate agencies provide service for a given trip.	Functional	Achieved
Includes and compares multi-modal transit, driving, walking to transit options. Optionally includes bicycling, carpooling, intercity bus/rail transportation.	Functional	Achieved, except for optional carpooling feature
Includes parking information, where applicable.	Functional	Achieved
Incorporates accessibility information and detailed accessibility features of the transportation network.	Functional	Partially achieved
Uses historical or real-time data/information on travel times.	Functional	Partially achieved
Uses historical or real-time driving data/information to recommend a route for an auto trip and to compute estimated travel time.	Functional	Not implemented; alternatives available
Computes travel time based on schedule data; provides alerts on real-time incidents or delays.	Functional	Achieved
Includes travel costs for all modes included in trip planner, including parking costs (if applicable).	Functional	Achieved, except for parking costs
Is integrated with existing systems using Intelligent Transportation Systems (ITS) standards implemented in XML.	Standards-Based	Not implemented
Is Section 508-compliant.	Standards-Based	Achieved
Reduces or offsets operational costs, such as call center.	Outcome	Theoretically achieved; not quantifiable
Facilitates increases in transit ridership.	Outcome	Theoretically achieved; not quantifiable

MMTPS Functional Objectives

The functional objectives were measured using qualitative examination of the system features combined with measurement of user satisfaction and perception using online survey data. RTA's MMTPS system achieved most of these functional objectives through an incremental implementation over the past seven years. The carpooling feature was excluded because the same functionality was already covered by a transit agency system in the region. The system does provide near real-time alerts about delays and disruptive incidents; however, real-time information is not included in the calculation of travel times due to steep barriers of cost and system limitations.

User satisfaction with many system characteristics, such as application speed and ease of use, averaged in the low 70 percent range. While less than desired, specific user comments were solicited and revealed that the areas of greatest dissatisfaction can be remedied with ordinary system maintenance and minimal refinements of the application which are ongoing.

MMTPS Outcome Objectives

One of the main objectives of the MMTPS Cooperative Agreement was to create a trip planning system that "facilitates increases in transit ridership." The MMTPS link to ridership is based on the hypothesis that a certain percentage of the population chooses to drive only because they are unaware there is a public transit option for their daily commute or occasional trip. The only viable public transit option may involve complexities such as driving to transit and bus/rail transfers that are too hard to plan or too intimidating for a new transit rider. A multi-modal trip planner could help potential riders overcome such difficulties.

A non-incentivized online survey achieved only a 0.2 percent participation rate among MMTPS users and, therefore, can only predict the system's effect on ridership within an order of magnitude. Based on a combination of survey responses applied to the broader population of riders, the study predicted that the system's availability could account for a 1.4 percent increase in ridership (72,000 out of 60 million rides per month) after its second year of operation. Observed trends in ridership could not be correlated to this theoretical result because of other overlapping trends affecting ridership in the region.

Another outcome objective of the MMTPS Cooperative Agreement was to create a trip planning system that "maintains or reduces operating costs per passenger mile and offsets other costs..." By increasing ridership in a system that is not already at capacity, it follows that costs from incremental passenger miles will be less than incremental fare income, thus reducing costs per passenger mile overall. The self-service system also has the theoretical potential to offset call center costs for RTA and its service boards by reducing call volume relating to trip planning. A lack of detailed metrics on call center operations made this correlation impossible to confirm. The system also has the potential to reduce

system maintenance and operation costs by retiring legacy information systems and eliminating the need for individual service boards to develop and maintain trip planners.

Another factor for understanding relative cost-to-benefit of the MMTPS is based on its comparison with one other alternative in the marketplace. At the time the MMTPS Cooperative Agreement was conceived in 2004, there was no alternative to the MMTPS as a reliable and accurate self-service trip planning tool in the greater Chicago region. However, in mid-2008, a multi-modal trip planner with many of the features envisioned by the Cooperative Agreement was rolled out in the Chicago region by Google, Inc. The Google Transit product was provided free of charge, presumably based on its ability to increase its online advertising revenue. The MMTPS would not be fully released for another two years and would cost around \$3.3 million. Despite the cost advantages of Google Transit, it compares less favorably to the MMTPS in other areas. Google Transit covers only portions of the regional system concentrated in the city of Chicago and its innermost suburbs, it lacks key features provided by the MMTPS, and it does not have the institutional commitment that a public sector agency provides. Google could theoretically abandon the system if ad revenues were not sufficient to justify it.

MMTPS Standards-Based Objectives

A stated objective of the Cooperative Agreement was to create a trip planning system that “is integrated with existing systems using Intelligent Transportation Systems (ITS) standards...” Among other goals, FTA wanted the system to serve as an operational test of ITS standards. In early 2008, RTA determined that this standards-based objective could not be achieved by the MMTPS project for a combination of reasons. The only cost-effective solution was to use a commercial off-the-shelf (COTS) solution from Mentz, and this product was not compatible with applicable ITS/XML standards. RTA’s system integrator found technical deficiencies with certain ITS standards (at their level of maturity in 2008). It was estimated that costs of converting the pre-existing Illinois Transit Hub (Data Warehouse) component of the system for compatibility with ITS standards would be more than \$1 million. With the emergence of General Transit Feed Specifications (GTFS) data formats, the ITS standards became less imperative.

Marketing Efforts and System Usage

The system first went live and became accessible by the public as a beta test in July 2009, followed by a full release in November 2010. Analytical measurement tools showed a continuous increase in unique monthly visitors to the site, peaking in July 2011, with a seasonal reduction in the fall of 2011. The average monthly usage after the full system release has been 128,000 unique visitors per month, representing 1.6 percent of the regional population served. This level is not insignificant for the single-purpose MMTPS website, when compared with the 4–7 percent who visit

multi-purpose transit sites in similarly-populated regions. Such sites draw users for recurring activities other than trip planning like fare card account management.

The marketing action with the single greatest impact and lowest cost was to influence relevant public and private websites to include prominent home page links to the MMTPS site for transit directions. A total of 64 percent of all MMTPS website traffic comes as page referrals from other websites.

Because the system was improved and released incrementally over the course of four years, there was never an ideal time to engage in a single comprehensive marketing push as was originally planned. Thus, an untapped potential to reach significantly more users remains.

Conclusions

As an operational test for the application of ITS/XML data exchange standards, the project did not satisfy its objectives. As a model for other transit agencies, the project offers a solution that is certainly viable, but it may not have a favorable cost-benefit ratio. Nevertheless, RTA's MMTPS is the only all-modal trip planner that serves the entire region, and it may be the only system in the U.S. that nearly matches the original functional objectives envisioned by FTA. The RTA MMTPS will continue to serve the Northeast Illinois region and promote ridership by making the multi-agency transit system more approachable and easier to use.

Readers of this report can access the MMTPS directly at www.goroo.com.

Introduction

The original Multi-Modal Trip Planning System (MMTPS) Cooperative Agreement conceived by the Federal Transit Administration (FTA) in 2004 was awarded to the Northeastern Illinois Regional Transportation Authority (RTA) at the end of that same year. The Cooperative Agreement embodied a number of functional and technical objectives for developing a door-to-door multi-modal trip planner. The functional objectives have mostly been achieved by RTA's MMTPS system through its incremental implementation over the past eight years. In addition to functional objectives, the Cooperative Agreement also included the overarching objectives of increasing ridership and decreasing operational costs. While it is difficult to show a direct numerical correlation between the availability of the MMTPS and ridership and costs, this report will show a theoretical correlation and highlight some influencing factors. One significant objective of the Cooperative Agreement was for the MMTPS to be built on Intelligent Transportation System (ITS) standards. This report provides an overview of the reasons that the MMTPS would not be developed using ITS standards. A separate white paper produced by RTA explores this topic in greater depth.

As an Operational Test for FTA, the Cooperative Agreement had additional objectives of knowledge capture and evaluation. This final report helps to fulfill those objectives by encapsulating findings of the operational test.

RTA and its Service Boards

The Northeastern Illinois RTA is the third-largest public transportation system in North America, providing more than two million rides per day. RTA's system covers 7,200 route miles in the six-county region that includes the greater Chicago metropolitan area and has a population more than 8 million. The combined assets of RTA are valued at more than \$42 billion and include 5,640 bus and rail cars and 650 vanpool vehicles.

RTA was established in 1974 and was reorganized in 1983 when its three "service boards," known as the Chicago Transit Authority (CTA), Metra commuter rail (Metra) and Pace suburban bus (Pace), were established as separate agencies governed by separate boards. RTA's primary responsibilities became financial and budget oversight of CTA, Metra, and Pace and regional transit planning issues. One key environmental factor impacting the MMTPS project was that each service board has a narrow area focus that is not necessarily aligned with the seamless regional transportation objectives promoted by the RTA:

- CTA is focused on bus and light rail trips within the city limits of Chicago and its closest suburbs.
- Pace is focused on a network of bus routes covering the surrounding suburbs of Chicago.
- Metra is focused primarily on light rail lines radiating from Chicago's downtown commercial district outward to communities in a large six-county region surrounding Chicago.

The three service boards each use disparate information systems managed by their own technology departments. Therefore, it falls to the engineering and technology group under RTA's planning arm to undertake regionally-focused technology projects such as the MMTPS. While RTA can promote and encourage technical collaboration between the service boards to support regional transportation, it does not have the institutional authority to mandate project participation and standards compliance.

Background and Project History

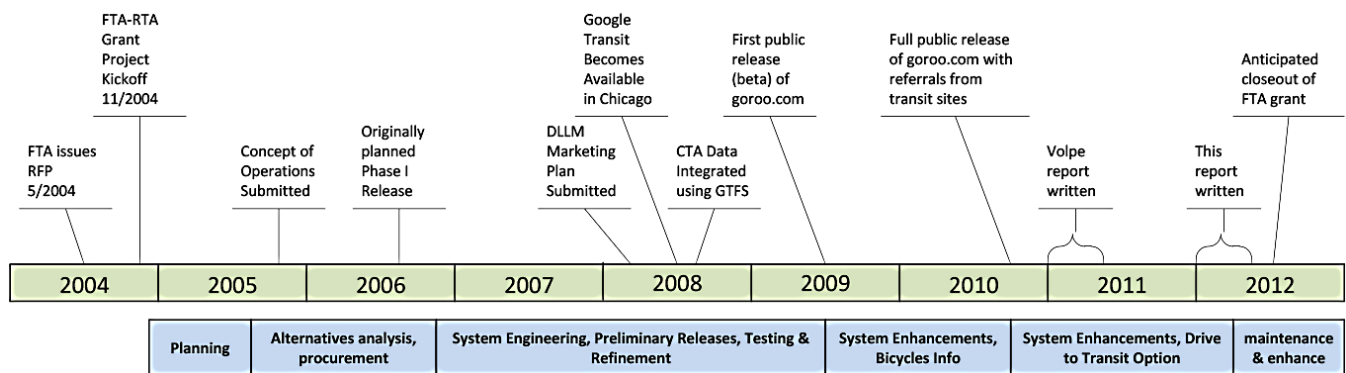
In June 2004, FTA issued a Request for Proposals (RFP) from regional transportation agencies to participate in a Cooperative Agreement to implement and operationally test a Multi-Modal Trip Planning System. The RFP set forth several objectives for the MMTPS, which are enumerated throughout this report. In November 2004, FTA and RTA entered into a Cooperative Agreement to undertake this project. The original project plan called for a two-phase approach, with the core systems scheduled for implementation by August 11, 2006. Subsequent planning, conceptualization, and the procurement of system integration services were not completed until late 2005 when SAIC was selected as the system integrator. After additional rounds of planning, initial system engineering work, and a thorough alternatives analysis, RTA presented a detailed plan to FTA in April 2008 that would make substantial changes to the project as originally envisioned:

- For reasons summarized in this report and described in depth in a separate RTA white paper, ITS Standards would not be used for data exchange between integrated system components.
- A Commercial Off-The-Shelf (COTS) product was selected as the main MMTPS component.
- The use of a COTS system required that most functionality be bundled into a single system release instead of through a multi-phase release as originally planned.
- The single release precluded the opportunity for a go/no-go decision point after partial implementation

System engineering and implementation work continued under this new plan until the first beta version of the system was released to the public in mid-2009. The local brand name of the system selected by the RTA was goroo.com. The name was chosen to satisfy numerous objectives as set forth in a marketing study conducted by RTA in early 2008. After beta release, further engineering and enhancements were necessary before a full and significantly-improved version of the system was released in fall 2009. At that time, the system was promoted as the primary trip planning tool for the region and was linked from the service board websites. Additional features, particularly the option for drive-to-transit itineraries, came online in incremental releases through spring 2012.

Figure 1-1

Project Timeline



Scope of This and Prior Reports

Much of the scope of this report overlaps the scope of the National Volpe Center report on this same MMTPS grant project. This final report differs from the Volpe Center's effort in that it evaluates the end-product based on the functional objectives, standards, and outcomes envisioned in the 2004 Grant RFP, and it does so from the implementing agency's perspective. This report also considers aspects of the system that went live in the 16 months after the Volpe research was concluded in early 2011.

The Volpe report focuses on approach and project management, drawing key findings relevant to FTA in conducting future operational tests. This report focuses less on the operational test and more on the effectiveness of the MMTPS that was the product of the operational test.

Table 1-1
*Comparison of Scope
of Volpe Report and
This Report*

	Scope of Volpe Report May 2011	Scope of This Report June 2012
Examination of all system releases.	Partially covered through public release in Fall 2010	Covered – includes additional releases through Spring 2012 such as drive-to-transit option
Measurement of effectiveness in meeting grant functional objectives.	Cursory coverage	In-depth coverage
Measurement of effectiveness in market penetration and in advancing ridership.	Not covered	Covered
Comparison with and history of alternative MMTPS technologies worldwide.	Cursory coverage	Not covered, except mention of Google Transit, which is relevant in region
Consideration of lessons learned for other FTA operational tests.	In-depth coverage	Not covered
Discussion of effectiveness in advancing knowledge around ITS and other standards.	In-depth coverage	Cursory coverage; defers to separate RTA White Paper on this topic

SECTION 2

MMTPS Functional Objectives

The MMTPS Cooperative Agreement included a number of functional objectives for developing Web-based self-service door-to-door multi-modal trip planner. RTA's MMTPS system achieved most of these objectives through an incremental implementation over the past seven years. FTA's original RFP specified the following seven functional objectives for an MMTPS that:

- Provides door-to-door travel options with transit treated as a single system regardless of how many separate agencies provide service for a given trip.
- Includes at least transit, driving, walking (e.g., walking to transit), and multi-modal travel (e.g., driving to transit) as options, but may also include options for bicycling, carpooling, intercity bus/rail transportation, or other modes.
- Includes parking information where applicable.
- Incorporates accessibility information and features of the transportation network (e.g., street types, pedestrian signals, curb cuts, accessible transit locations) and accommodates customer preferences and constraints (e.g., minimum walking distance, fastest trip, rail only, accessible features and locations).
- Uses historical or real-time data/information on travel times to enable travel choices throughout the metropolitan region based on typical or real-time transit and driving travel conditions.
- Uses historical or real-time driving data/information to recommend a route for an auto trip and to compute the estimated travel time.
- Uses schedule travel time data on transit routes to compute the estimated travel time for a transit trip; incorporates real-time information on transit incidents and delays, and provides alerts of these incidents and delays and/or uses this information in the recommendation of routes and estimation of travel times.

For evaluating the MMTPS system against these specific functional objectives, this report considered a combination of factors:

- A hands-on qualitative examination of how each function was implemented in the MMTPS.
- Measurement of user satisfaction with features through survey results.
- Measurement of user perception of system performance, accuracy, and usability through survey results.
- Understanding of explanations for functional objectives that were not implemented.

Specific Findings

The seven bullet points from the Cooperative Agreement description were broken down further into discrete system features that could be measured separately. Each feature objective is presented in Table 2-1 with one or more measurement criteria, an overall outcome rating, and details about the findings. The outcome ratings for the qualitative implementation of functional objectives were “Implemented,” “Partially Implemented,” or “Not Implemented.” Some objectives were also measured on a quantitative scale of user satisfaction and other parameters. These outcomes are shown in purple when the 80% satisfaction or other quantitative target was met, blue when within 20% of the target, or white if more than 20% from the target.

Table 2-1

Measurement and Findings of MMTPS Functional Objectives

Objective	Measurement	Outcome	Detailed Findings
Provides door-to-door travel options with transit treated as a single system regardless of how many separate agencies provide service for a given trip	Qualitative examination of features	Implemented	Primary accomplishment of system. RTA's MMTPS application currently the only automatic means in Greater Chicago region of finding a multi-modal trip itinerary combining service from multiple transit agencies. Individual service boards and google.com transit can provide single modal transit directions, but only MMTPS provides a variety of modal combinations. Individual trip itineraries include walking segments, bus segments (from 2 different bus agencies), light rail segments (from 2 different rail agencies) and drive-to-transit segments. Bicycle-based trips are also provided as an option.
	User perception of speed – page load under 4 seconds	Implemented	Only 15.9% of respondents perceived that page load time was above 4 seconds; 35.9% perceived it was under 2 seconds. Google's benchmark research shows that 47% of users expect a Web page to load in 2 seconds or less. However, expectations are relaxed for computationally-complex results such as in an MMTPS system.
	User satisfaction with application speed >= 80%	71%	Asked specifically about speed, 70.7% reported being Very Satisfied or Somewhat Satisfied. Evaluators for this report found 15+ second page load times, in some cases caused by loading of online advertisements. This is being rectified in future maintenance releases.
	User satisfaction with ease of use >= 80%)	66%	Asked specifically about ease of use, 65.5% reported Easy or Very Easy to use; only 10.3% reported struggling with the system.
	Overall user satisfaction >= 80%	70%	Asked about their overall experience, 69.6% reported being Very satisfied or Somewhat satisfied.

Table 2-1 (continued)*Measurement and Findings of MMTPS Functional Objectives*

Objective	Measurement	Outcome	Detailed Findings
Provide seamless integration of data from various source systems.	Qualitative examination of features	Implemented	Results screen shows alternative multi-modal public transportation, driving, and sometimes driving to transit. Single uniform interface shows trips combining data from 4 different agencies (CTA, Pace, Metra, IDOT.) Relevant RTA test cases passed.
Includes transit; includes multi-modal	Qualitative examination of features	Implemented	Trip results include transit options from one or more public transit agencies (CTA, Metra, and Pace). Relevant RTA test cases passed.
	User perception of effectiveness in finding a “reasonable” public transit route $\geq 80\%$	80%	80.0% reported either effective or somewhat effective.
Includes driving	Qualitative examination of features	Implemented	Trip results include driving-only options. Trip results also provide drive-to-transit options when applicable. Relevant RTA test cases passed.
	User satisfaction with accuracy of driving option results transit results $\geq 80\%$	Indeterminate	51.7% reported that they “did not notice or pay attention to the driving option...” Based on this and other answers, the vast majority of users came to the site strictly for public transit information.
Includes walking	Qualitative examination of features	Implemented	Trip results for public transportation include walking segments between transit stops/stations and the user’s start and end points. Relevant RTA test cases passed.
Includes driving to transit options	Qualitative examination of features	Implemented	Trip results include a drive-to-transit option where the route is feasible. Side-by-side presentation of options helps user to determine cost in travel time relative to benchmark of driving. Relevant RTA test cases passed.
Includes bicycling (optional)	Qualitative examination of features	Implemented	Trip results include a bicycling option. Essentially this is same as driving option where shortest path is selected and travel times are factored higher. Relevant RTA test cases passed. Feature does NOT include multi-modal options, bringing bicycles onboard Metra trains during hours permitted.
Includes carpooling (optional)	Qualitative examination of features	Not implemented (optional feature)	No specific features are included for carpoolers that would help them to locate each other or to plan trips with multiple pick-up locations. At a minimum, links to other car-pool resources are provided from the MMTPS / goroo.com website.

Table 2-1 (continued)*Measurement and Findings of MMTPS Functional Objectives*

Objective	Measurement	Outcome	Detailed Findings
Includes intercity bus/rail	Qualitative examination of features	Implemented	Inclusion of Metra commuter rail lines allows itineraries to extend to remote towns in the 6-county region. Inclusion of Northern Indiana Commuter Transit District route allows for itineraries to cities well outside of greater Chicago like South Bend Indiana. Note that Amtrak itineraries are not included in results, thus precluding travel outside of the region.
Incorporates parking information where applicable	Qualitative examination of features	Implemented	Parking information is calculated for routes involving Metra stations where Metra parking facilities are collocated. Relevant RTA test cases passed. Private lots, many municipal lots, and other parking options are excluded.
	User perception of parking information accuracy	Indeterminate	86.2% reported either that they did not know nor “did not notice or pay attention to parking information...”
Incorporate accessibility information	Qualitative examination of features	Implemented	Accessible services for persons with disabilities can be entered as a search parameter in trip planner interface. Relevant RTA test cases passed. Accessible services for persons with disabilities are indicated within system by a person with disabilities services icon.
Incorporates other features of the transportation network (e.g., street types, pedestrian signals, curb cuts)	Qualitative examination of features	Partially implemented	Specific accessibility features such as curb cuts are not enumerated; only an overall Yes/No accessibility data point is stored for each station.
Accommodates customer preferences and constraints (e.g., minimum walking distance, fastest trip, rail only, accessible features and locations)	Qualitative examination of features	Implemented	System provides all requested input options. Relevant RTA test cases passed.
Uses historical or real-time driving data/information to recommend a route for an auto trip and to compute estimated travel time	Qualitative examination of features	Not implemented	In cases tested, system provided same travel time estimate for rush hour and low traffic periods for the same route.
	User perception of travel time accuracy \geq 80%	72%	72.1% of respondents perceived MMTPS’s prediction of travel times “about right” or slightly longer than actual; only 6.9% perceived trip results to be more than 20 mins below actual.

Table 2-1 (continued)*Measurement and Findings of MMTPS Functional Objectives*

Provide alerts of incidents and delays	Qualitative examination of features	Implemented	On the home page, the system provides information on known incidents and delays received from other agencies.
Provide travel estimates that take into account known incidents and delays	Qualitative examination of features	Not implemented (optional feature)	System does not take transit incidents/delays into account when suggesting routes and computing travel times, even when travel advisories are posted for locations along the requested route.
Include travel costs for all modes,	Qualitative examination of features	Implemented	System provides accurate fare information for all service boards. Relevant RTA test cases passed.
	User perception of accuracy of cost information \geq 80%	70%	Only 70.1% of respondents who indicated they were knowledgeable found cost information provided to be accurate.
Includes parking costs	Qualitative examination of features	Not implemented	System does not provide parking costs, even for supported Metra lots that are included in Drive-to-Transit calculations.

Explanations for Objectives Not Implemented

For the objectives presented above with an outcome of “Not implemented,” the following explanations are presented based on project environmental factors, negative cost/benefit analysis, and technical barriers.

Decision to exclude carpooling information: The nature of a ride-sharing or carpooling site would include separate interfaces and features that do not easily overlap those of a multi-modal trip planning website. It was the unanimous opinion of project planners back in 2005 that any efforts to promote carpooling would best be served by a ride sharing website that was already in operation by the Chicago Metropolitan Agency for Planning. This system was eventually taken over by Pace and branded as “Pace Rideshare.” The Pace site includes a link to the MMTPS to aid in identifying driving or drive-to-transit routes for the car poolers. The cost-to-benefit ratio of including all functions in a single site with the MMTPS was not favorable. Regardless, it was questionable whether the RTA would be the appropriate sponsoring agency.

Decision to exclude private lots, municipal lots, and other parking options from provided parking information and from drive-to-transit calculations: The included Metra co-located lots have the best chance of providing relevant results to travelers seeking drive-to-transit options. These

lots are most prevalent in the peripheral suburbs further from Chicago where bus routes are scarce and the drive-to-transit option is most viable. The Metra co-located lots were easily imported from an existing, no-cost, reliable data set. RTA had extensive discussions with Standard Parking (a parking management firm) to obtain data on private lots, but negotiations fell through when Standard Parking and other parking management firms decided to outsource and monetize these data. The inclusion of municipal lots would have benefited fewer riders and would have required integration and a manual survey of available options resulting in higher costs for the project. The cost-benefit ratio for inclusion of data on private and municipal lots was not favorable.

Decision to exclude known high/low traffic periods and known incidents and delays from calculation of driving travel times: Such features would have required expensive data subscriptions to private data providers such as NavTeq. By 2005, users who were interested in more robust driving information had numerous free websites at their disposal such as Google Maps and MapQuest. The cost to benefit ratio for this feature was not favorable considering the alternatives.

Decision to exclude known incidents and delays from calculation of transit travel times: Feeds of transit disruptions and major incidents are fed into the MMTPS system in text form so that they are easily relayed to users on the home page. However, these data feeds are not formatted in any standardized and calculable form that would allow the Mentz MMTPS engine to consider them in its derived travel times. RTA did not have the institutional authority or the funds to request that services boards provide actionable data feeds for incidents and delays.

Real-time information on schedule adherence and routine delays is theoretically available to the MMTPS from some of the service boards. Real-time bus location and schedule adherence data are captured and used within the highly successful and popular Bus Tracker system, which is provided by CTA. BusTracker allows CTA customers to look up when the next bus will arrive at a selected stop on a selected run. However, the underlying data within CTA's BusTracker are not available externally from the closed system. BusTracker is a proprietary system sold to CTA and maintained by a vendor. The vendor declined to provide an interface for its underlying real-time vehicle location and schedule adherence data to CTA, and the RTA MMTPS system by extension. The nature of the agreement between the vendor and CTA was to provide the predicted bus arrival times through a consumer user interface, not the internal data structures that the vendor protects as proprietary intellectual property.

CTA developed a predictive TrainTracker system similar to BusTracker that could eventually provide real-time information to the MMTPS about how closely trains were adhering to schedule. This was not available during the primary engineering phases of the MMTPS system, but it is theoretically available in future releases. Unlike BusTracker, CTA retains full control over the intellectual property and underlying data.

Pace Bus has GPS tracking but does not have predictive software in place. Pace could theoretically build on existing systems to provide real-time information on schedule adherence to the MMTPS in the future. Metra does not yet have the basic infrastructure in place to provide this capability.

Decision to exclude parking costs from calculations: The Metra co-located lot locations and capacities were easily imported from an existing, no-cost, reliable data set. However, parking costs were not included in a standardized format within this data set. RTA decided that including parking costs on trip plans is not consistent with travel behaviors. Driving trips do not necessarily require “paid” parking (e.g., free on street, business parking offered free to customers or guests, etc.). Additionally, a drive to transit itinerary could be a kiss-and-ride (no parking) or a park-and-ride (parking). To keep it flexible and reduce user entry, users are not asked to choose one or the other.

MMTPS User Feedback on Functionality

The online survey invited users to leave feedback about specific problems they had with the site. Many were only perceived problems, and many were legitimate concerns or valid ideas for future enhancements. The quotes in this section were collected from anonymous system users between April 7, 2012, and May 11, 2012, through the SurveyMonkey.com survey engine that was linked from the goroo.com website.

Criticism about Address and Landmark Search Results

Most critical comments were related to searching on origin and destination locations. These symptoms are most likely based on data quality issues with the landmarks and street address ranges contained in the street-level mapping data used by the MMTPS. Future efforts might remove ambiguous land marks and improve recognition of popular search terms.

- "My goal was to find transit routes from Midway Airport to the nearest South Shore station (ultimate destination South Bend, IN). Station selection was arduous due to a search engine that apparently has no fuzzy logic or optimal choices for origin-destination. Not being a Chicago native, it presented too many possible choices with no advice as to the best route."

- “Sometimes it can't create an itinerary or it populates the wrong addresses in the destination.”
- “Goroo often doesn't recognize addresses.”
- “I went to put an address in Chicago and I keep getting an address in Villa Park. I do not plan on using Goroo again“
- “It would not recognize my office location in Chicago and it would not recognize by destination which was a Metra station in Bartlett, IL.”
- “Required knowing which Addison station—Blue or Brown line. As a stranger to Chicago, this was not helpful.”
- “Not really errors, just wouldn't recognize some landmarks (typing in "addition Red line" yielded two different options, both for the Red line, it seems) “
- “I tried to put in 1430 W. Irving Park and it would only take me to 2700 W. Irving Park.”

Perceived Issues

Many issues perceived with the system are likely tied to user's browser security or other settings that would have a negative effect on complex Web applications in general, not just on the MMTPS. Other perceived issues may be due to lack of familiarity with features of the MMTPS.

- “... missing map sometimes.”
- “The only reason I am taking this survey is to tell you to incorporate maps with the individual route information....” This route map feature is indeed part of the system; however, the user may perceive it is not there because their browser was blocking the java-scripted map functionality. The following user response recognized this situation. “... at first, it did not load because I had not enabled JavaScript for your sites.”
- “Ridiculous advice! Totally inefficient travel itinerary, including walking 1.4 miles to catch a bus!” The user was apparently unaware that there is a control that can limit the maximum walking distance in favor of other parameters.
- “My recent Locations are not showing up.” This can be caused when user cookies are not enabled.
- “It would not recognize the ‘Olgivie [sic] Train Station’ as a location. One had to search for the street address before I could get directions.” “Ogilvie” spelled correctly is indeed recognized. The MMTPS does not have a feature to automatically correct for user spelling mistakes as other search engine sites do. For example, google.com would reply “Showing results for Ogilvie Train Station.”

Requested Improvements

The following user responses identified desirable improvements to the system. All of these would require funding for additional programming efforts and may be considered in future releases of the system.

- “Suggestion: When I click edit my trip, "transportation mode preferences" are reset. Don't—leave at what I set them.”
- "Does not copy into emails well." This comment likely refers to a feature in Google and other travel direction sites that lets users copy just a link to a particular travel itinerary into an email so that their email recipient can reproduce the itinerary on their end. The MMTPS does not have this feature but does allow the user to send an all-text version of the itinerary by email.
- “The maps in the individual step-by-step instructions were useless: too tiny to follow and no zoom option available.” This does not refer to the overall route map, which has zoom controls and is highly readable, but it is an accurate criticism of the optional maps which can be displayed for individual turn points.
- "... How do I display a map of the route with bus stops highlighted?" The map indeed does not display bus stops along the route other than departure and destination.
- “[Fare calculation] does not account for CTA transfers (25 cents for the first transfer, free for the second transfer).”

Positive Feedback

Even though the survey asked for users to identify any specific issues they were having with the site, a few took the opportunity to respond with praise:

- “Thank you, excellent help. Needed the time and fare cost from Jefferson Park to O’Hare Airport.”
- “I cannot use stairs, so am restricted to buses with least walking. GOROO enabled me to input this info.”

SECTION
3

MMTPS Outcome

Objective: Ridership

One of the main objectives of the MMTPS Cooperative Agreement was to create a trip planning system that “facilitates increases in transit ridership. “

The basic hypothesis behind this ridership objective is:

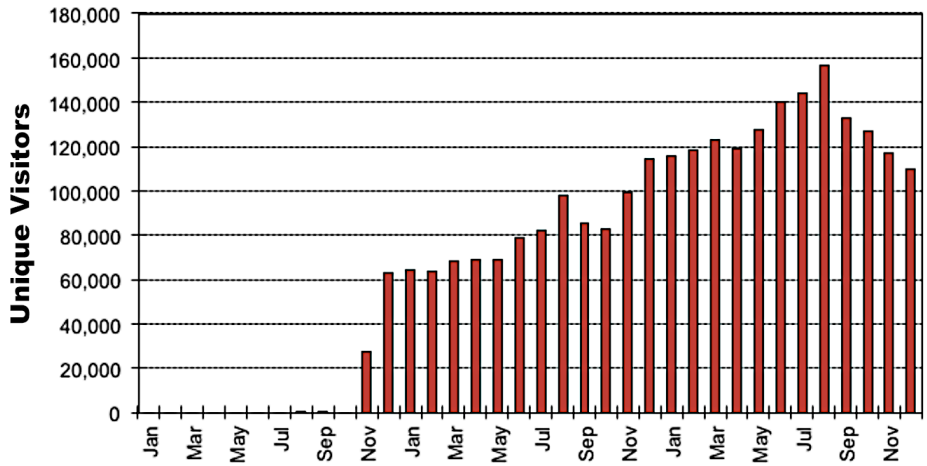
1. There are individuals in the service region making driving trips that could be replaced with public transit trips.
2. Such individuals do not choose public transit for their trip because they are not aware that a transit option exists or is viable. The only viable public transit option may involve complexities such as driving to transit and bus/rail transfers that are too hard to plan or too intimidating for a new transit rider.
3. A multimodal trip planner could overcome such obstacles for individuals by calculating viable multimodal public transit routes, fares, and travel times and by providing side-by-side comparisons to the driving option. The system would make such individuals comfortable with choosing public transportation.
4. If the system were readily available online, easy to use, accurate, and reliable, and if the regional population were made aware of the system’s existence through marketing efforts, then they would try it for their daily commutes or occasional trips.
5. If the public transportation options identified by the system were viable or preferable for a significant number of user trips, the ridership would increase.

This section of the report seeks to evaluate whether or not the logical points of the above hypothesis are observable in the region, first looking at the how much the system is being used and if it has any meaningful statistical correlation to ridership trends. Then, marketing efforts, or lack thereof, are examined to determine if a higher user base is possible. Finally, whether or not existing users have found the sort of results that would influence them to choose public transit is examined.

Usage Levels

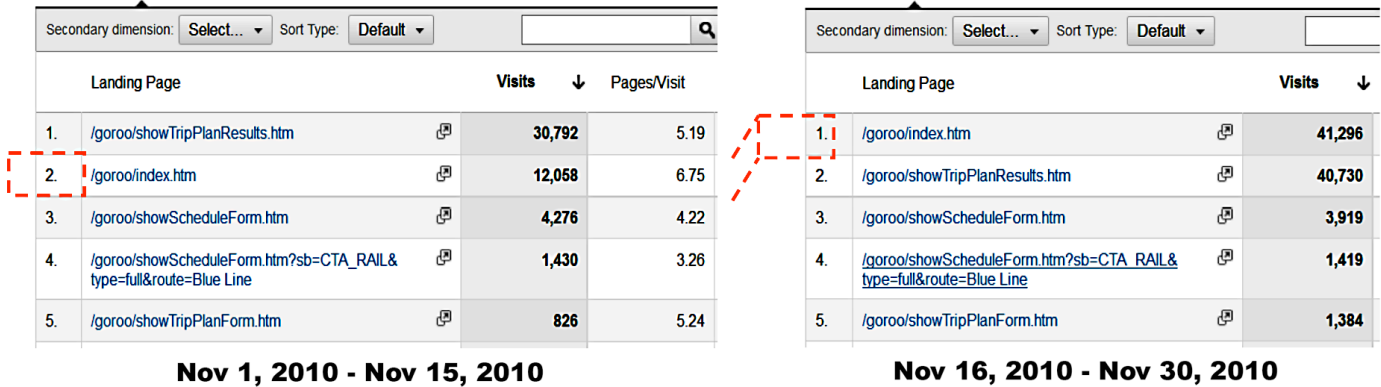
The MMTPS system first went live and became accessible to the public as a beta test in July 2009, but publicity was intentionally muted at that time. Google Analytics, a package of website analysis tools, was integrated into the system to track usage trends starting November 2009. RTA released several incremental enhancements in November 2010, removed the beta test label, and officially promoted the MMTPS as the preferred trip planning tool for the region. Overall, Google Analytics showed a continuous increase in unique monthly visitors to the site, peaking in July 2011. The analytics detected a significant boost in November 2010 when the site was more widely promoted.

Figure 3-1
Unique MMTPS Site
Visitors per Month



In particular, Google Analytics detected more than a 3× spike in unique visitors to the site’s home page at the time of the November 2010 publicity. This was attributed to RTA and its service boards promoting links from their sites to the home page and a major increase in referral traffic. Traffic to home page more than tripled (from 12,058 to 41,296) in consecutive two-week periods.

Figure 3-2
Spike in Unique Visitors to Home Page



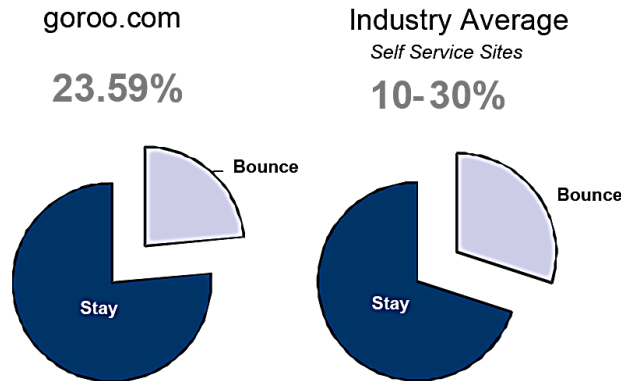
After July 2011, traffic to the site tapered off slightly. A proportionally similar peak in traffic appeared in July 2010, so this tapering off of system usage in the fall months may be explained by seasonal patterns. One possible theory is that the summer months bring a higher number of tourists to downtown Chicago from the surrounding region and that tourists are more likely than established commuters to seek out assistance with public transportation trip planning.

The peak monthly usage for the MMTPS/goroo.com website was 156,920 unique visitors in July 2011. The average monthly usage after the full system release was approximately 128,000.

Google Analytics applied to goroo.com has shown a bounce rate of 23.59 percent, which is well within the normal industry range for self-service websites. (Bounce rate is the percentage of single-visits, i.e., visits in which the person left the site from the entrance page. Bounce rate is a measure of visit quality. A high bounce rate generally indicates that the site entrance—landing pages—is not relevant to the visitors.) Applying the bounce rate to the average monthly visitors shows that approximately 97,800 users per month are looking up trip results.

Figure 3-3

Bounce Rate Comparison with Industry Average



Theoretical Effects on Ridership

A one-month user survey was conducted in April 2012 in conjunction with the preparation of this report. About 0.2 percent of users that month took the user survey. No incentives were offered for participation. This self-selected survey population is too small to be an accurate predictor of the behavior of the typical MMTPS user base, but it can still be used to predict ridership impacts within an order of magnitude.

The survey showed that 58 percent of respondents would definitely choose the public transportation option for the trip they looked up. What is not known is how many of these respondents would have taken the trip anyway had they not validated it using the MMTPS. For the sake of this thought exercise, we will optimistically assume 50 percent would be taking the trip because of their experience on the MMTPS.

To calculate the theoretical impact of using the tool to establish a regular commuting pattern, the survey showed that 8.1 percent of respondents were looking up options to establish a new daily commute to work or school. A daily commute represents up to 20 rides on public transit per month, not counting interagency transfers. Applying these figures to the average monthly number of site visitors who look up trip results, the MMTPS could theoretically impact regional system ridership by an additional 46,000 new commuter trips per month ($97,800 \text{ users} \times 58\% \times 50\% \times 8.1\% \times 20 = \text{approx. } 46,000$). The survey also showed 26.3 percent were looking up options for a single or occasional trip they

had not taken before. Assuming an occasional trip is two rides per month, and applying other figures, the MMTPS could theoretically impact regional system ridership by an additional 26,000 new trips per month ($97,800 \text{ users} \times 58\% \times 50\% \times 46.3\% \times 2 = \text{approx. } 26,000$) for a total of 72,000 rides per month.

All other users were re-confirming details on trips they had taken before, thus providing no additional impact on ridership.

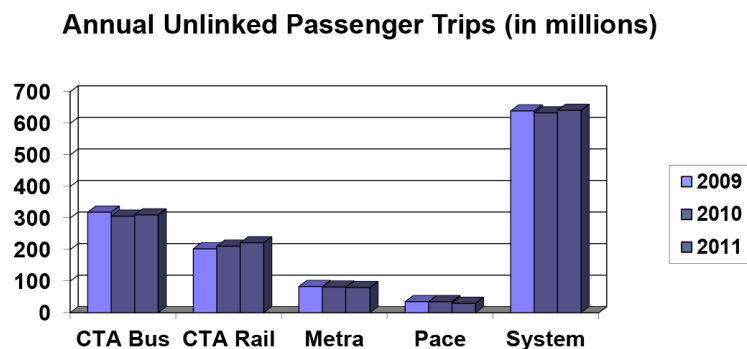
Comparing these 72,000 additional rides with the 60 million rides per month typically served by RTA, the MMTPS theoretical impact on ridership would be 0.12 percent per month. This is not entirely discouraging because a cumulative effect would build up each month. Assuming the effects of market saturation were not significant, the system could theoretically increase ridership by 1.4 percent after the first year of full operation.

Observed Effects on Ridership

Ridership in the region fluctuates seasonally as much as ± 10 percent but annually it is more stable. System-wide ridership dipped 1.0 percent in 2010 then rebounded 1.2 percent in 2011. This order-of-magnitude change is similar to the theoretical 1.4 percent change that the MMTPS could generate in a year, but this report cannot assume correlation because of numerous other simultaneous factors that affect ridership.

The dynamic fluctuations can be seen in the small but often opposing trends in ridership for each service board, as shown in Figure 3-4.

Figure 3-4
*Annual Ridership for
Each Service Board*



That CTA rail ridership increased steadily while Metra and Pace ridership decreased steadily suggests the cause may be attributed to dynamic shifts between city and suburban populations, changes in city and suburban employment levels, and other demographic changes. One example of regional demographic shifts is that the City of Chicago population declined by 6.9 percent, whereas suburban Kane County's population grew by 27.5 percent between the 2000 and 2010 census.

With these fluctuations and demographic shifts, it will not be feasible to observe anything on the order of the 2.5 percent theoretical impact of the MMTPS on ridership in the year 2011 when the system was in full production.

Figures 3-5 through 3-8 are charts showing ridership for individual service boards in the region, indicating that where there was an increase in 2011, which was a continuation of a trend in 2010, or a flat or declining trend. The polynomial trend line on each graph helps to filter out the seasonal fluctuations of ridership. As can be seen, the upward trending usage of the MMTPS site does not neatly correlate with ridership, where one would expect to see an upward “elbow” starting at the end of 2010. Only Metra rail and, to a lesser extent, Pace show an “elbow” where a declining trend in 2010 is reversed in 2011 at the time the MMTPS went into full production and its user base began to increase.

Figure 3-5
CTA Rail Ridership and
MMTPS Site Traffic

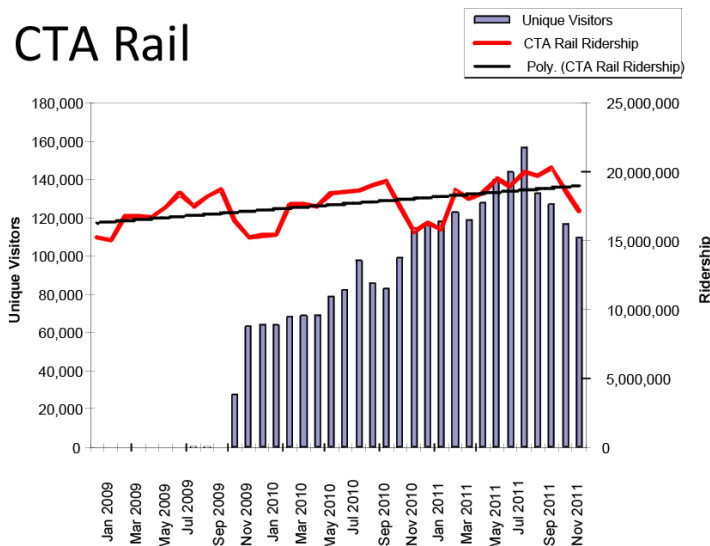


Figure 3-6
CTA Bus Ridership and
MMTPS Site Traffic

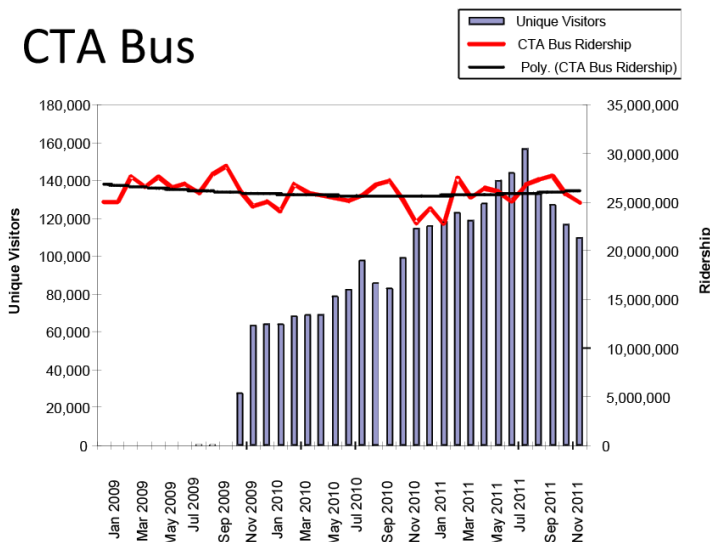


Figure 3-7
Metra Ridership and
MMTPS Site Traffic

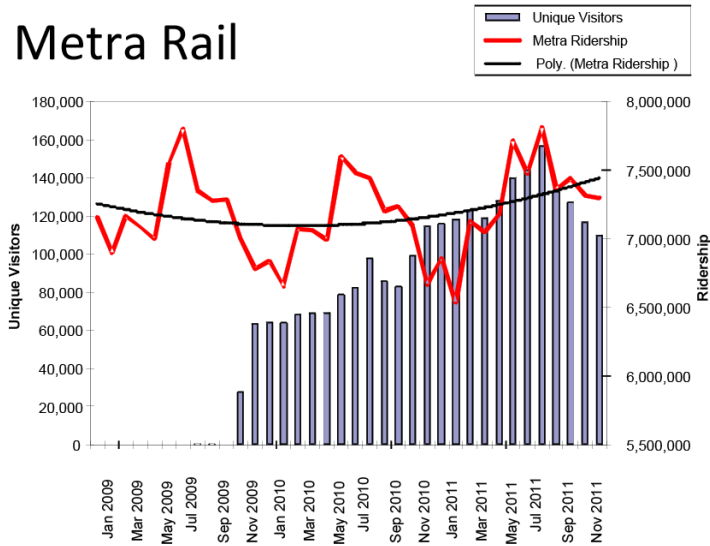
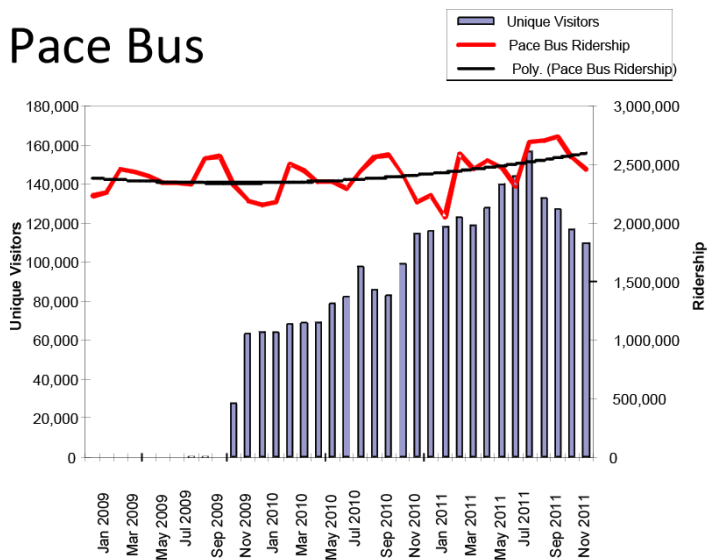


Figure 3-8
Pace Ridership and
MMTPS Site Traffic



The positive correlation between MMTPS usage levels and ridership levels on Metra and Pace suggests that the MMTPS may have had a positive impact on ridership in its first full year of operation. However, the small survey population available for this report and the statistical noise of numerous other contributing factors make it impossible to establish MMTPS quantifiable impact on ridership.

SECTION
4

MMTPS Outcome Objective: Cost Reduction

Another objective of the MMTPS Cooperative Agreement was to create a trip planning system that “maintains or reduces operating costs per passenger mile and offsets other costs, such as call center or e-mail responses.”

The potential for cost reduction per passenger mile is tied to the potential for an increase in ridership. As long as the system is not at or nearing capacity, then additional rides will increase passenger miles and corresponding fares without increasing costs at the same rate. The previous section concluded that the MMTPS had the theoretical potential to increase ridership by 1.4 percent after being in service for one year.

The system has the potential to offset other current costs borne by tax-funded transportation agencies in the region:

- Reduced RTA call center costs due to reduction in call volume relating to trip planning.
- Similar reduced costs for service board call centers.
- Reduced system maintenance and operation costs achieved by retiring legacy systems.
- Elimination of need for individual service boards to develop and maintain trip planners.

Call Center Cost Reduction

In theory, the availability of the MMTPS would allow some users to serve themselves in finding suitable multi-modal or other complex trip plans who would otherwise have called into an agency call center for the same information. Unfortunately, the RTA call center and the call centers for the service board agencies do not tally calls broken down by the category of each call. The same call centers handle questions about fares, special programs, lost and found, complaints, disruptions, and route changes. Several fare changes, special programs, and major closures in the region all caused fluctuations in call volumes, and all occurred around the time of the MMTPS launch. Thus, measurement of overall call volume could not be correlated to the availability of the MMTPS.

The service board websites already provided self-service information about major programs, major closures, and disruptions, so the availability of MMTPS/goroo.com as a hub of this information would have had a low theoretical impact on related call center volume. While the capacity for the MMTPS to reduce call center costs theoretically exists, it cannot be proven by the data currently available.

Cost of Alternative Systems

After the MMTPS went live, RTA gained the opportunity to retire a legacy trip planning system (Tripsweb) that had been stretched beyond its usable life. The Tripsweb system retirement is still pending because RTA internal staff members who use it have not yet been able to develop new business processes around the MMTPS as a replacement. The MMTPS project has not yet transitioned from its improvements and enhancements phase into routine maintenance. Thus, maintenance costs added by the MMTPS are not yet known. It is, therefore, not yet possible to determine if there will be a net system maintenance cost savings when the legacy trip planning application is retired. While both systems remain in service simultaneously, there is a net increase in system maintenance costs.

Cost prevention can be attributed to the existence of the MMTPS, because it has theoretically eliminated the cost of individual service board trip planning systems that might have otherwise been built. Both Pace and Metra have spent significant funds over the past eight years to upgrade their websites. They have avoided spending extra funds on trip planning functionality because of the availability of RTA trip planners (both MMTPS and the legacy Tripsweb before that timeframe).

Unlike Metra and Pace, the CTA service board has alternatively offered Google Transit to provide self-service trip planning in its geographically smaller region of Chicago and its closest suburbs. Thus, if the MMTPS had not existed, CTA would not have incurred the cost of developing its own replacement trip planner.

Cost vs. Benefit of MMTPS and Its Alternatives

At the time the MMTPS Cooperative Agreement was conceived in 2004, there was no alternative to the MMTPS as a reliable and accurate self-service multi-modal trip planning tool in the Greater Chicago region. RTA's legacy trip planner, Tripsweb, existed, but its range of functionality, accuracy, and maintainability were already limited. Tripsweb did not provide key features envisioned by the Cooperative Agreement including drive-to-transit, driving comparisons, biking, and real-time information. The complexity of public transportation in the region served by four largely-separate agency modes of transportation (Pace bus, Metra rail, CTA bus, CTA rail) required a self-service tool, such as the one envisioned by the Cooperative Agreement to facilitate the basic informational needs of riders. Many trips involving bus/rail transfers were too complex for users to derive using route maps and schedules alone.

However, in December 2005, a multi-modal trip planner with many of the features envisioned by the Cooperative Agreement was introduced by Google and covered public transit in the Portland, Oregon, area. By mid-2008, Google Transit provided coverage in the Chicago region but only for the area of Chicago and its nearest

suburbs that was serviced by CTA. The Google offering did not cover the outer suburban region serviced by Pace and Metra. Google provided Google Transit to Chicago regional travelers free of charge. Presumably, it was funded by increased website advertising revenue for Google.

CTA incurred some internal costs associated with the conversion of its route and schedule data to the General Transit Feed Specification (GTFS) developed by Google. However, similar costs would have been incurred by the agency to make its data consumable by the MMTPS through TCIP standards as envisioned by the Cooperative Agreement in 2004.

The direct project costs for the MMTPS totaled \$3.3 million—\$1.08 million in FTA funding, \$270,000 in RTA funding under an 80/20 sharing agreement, and more than \$2 million in additional RTA funding for changes and system enhancements spread over numerous phases. The ostensibly free Google Transit option that was implemented in under one year seems compelling when compared with the eight-year, \$3+ million MMTPS project, but not without several important counter arguments as summarized in Table 4-1, with the favorable comparisons highlighted.

Table 4-1
Comparison Between
MMTPS and
Google Transit

Area of Comparison	MMTPS	Google Transit
Approximate cost to tax payers	\$3+ million	\$0 <i>(no net cost of service boards' GTFS conversion over TCIP conversion)</i>
Earliest availability	October 2010 (Limited beta version available July 2009)	July 2008
Coverage	Full 6-county region, including the NICTD line	Only region covered by CTA, including Chicago and nearest suburbs (initially)
Door-to-door multimodal trip planning (bus/rail/walking)	Yes	Yes
Bicycling-only option	Yes	Yes
Bicycling-to-transit options	Yes	No
Ease of comparison between multiple transit options and driving.	Yes	Yes/Limited
Inclusion of real-time traffic conditions for driving option	No	Yes
Inclusion of real-time schedule adherence data for transit option	No	No
Inclusion of drive-to-transit option.	Yes	No
Strongly integrated live area travel advisories and common tourism attractions	Yes	No
Institutionalized commitment	Yes	No

While the Google Transit option is clearly the most favorable in terms of cost, there are two key advantages to the publicly-funded MMTPS project:

- *Coverage:* Google Transit's coverage includes only the CTA region. This may best be explained by the fact that the CTA region accounts for approximately 80 percent of the system's unlinked trips and hypothetically 80 percent of the audience for the online advertising hits. Had Pace and Metra converted to GTFS, it is questionable whether or not Google would have undertaken the incurred complexity and cost of combining multi-agency GTFS feeds into a single integrated system to capture the remaining 20 percent of the online advertising audience. The MMTPS covers the full region absolutely. Furthermore, the MMTPS project accommodated Pace and METRA's legacy interfaces and file format for route and schedule data and did not require the cost of conversion to a standardized format.
- *Institutionalized Commitment:* If advertising revenues associated with Google Transit fall short of expectations or other unknown commercial considerations emerge, there is no certainty that Google will continue to offer the free service to the region. By contrast, the MMTPS is taxpayer-funded by a government agency that will continue to provide the service as long as the public demands through representational government.

SECTION
5

MMTPS Objectives for Use of Technical Standards

Intelligent Transportation Systems (ITS) Standards

A stated objective of the Cooperative Agreement was to create a trip planning system that “is integrated with existing systems using Intelligent Transportation Systems (ITS) standards implemented in XML.” Among other goals, FTA wanted the system to serve as an operational test of ITS standards.

In early 2008, RTA determined that this standards objective could not be achieved by the MMTPS project for a combination of reasons. RTA presented reasons for embracing standards other than ITS in its separate white paper titled “Intelligent Transportation System (ITS) Standards & the Multi-Modal Trip Planner System (MMTPS).”

A brief recap of the white paper’s justification for deviating from the ITS standard includes these four points:

- A thorough alternatives analysis determined that a Commercial Off-the-Shelf (COTS) solution from Mentz was the preferred system approach. It was much later determined after selection had been made that the Mentz system was not compatible with the applicable ITS/XML standards based on SAE ATIS J2354 and TCIP.
- The project budget was later found to be insufficient, even when combined with significant additional RTA funding, to pay for efforts to convert connected systems to use the ITS standard. SAIC, RTA’s systems integrator, estimated that ITS/TCIP standards compliance would have added more than \$1 million to the project cost.
- RTA leveraged a pre-existing system known as the Illinois Transit Hub that already accommodated proprietary agency interfaces for extracting schedule and route information from the service boards. The data model within the ITH was generally incompatible with that of ITS standards.
- RTA’s systems integrator SAIC conducted a thorough analysis of the TCIP standards (at their level of maturity in 2008) and found technical deficiencies.

With the emergence of other data formats in the industry such as GTFS, the ITS standards became less imperative. GTFS did not exist at the time this Cooperative Agreement was envisioned in 2004.

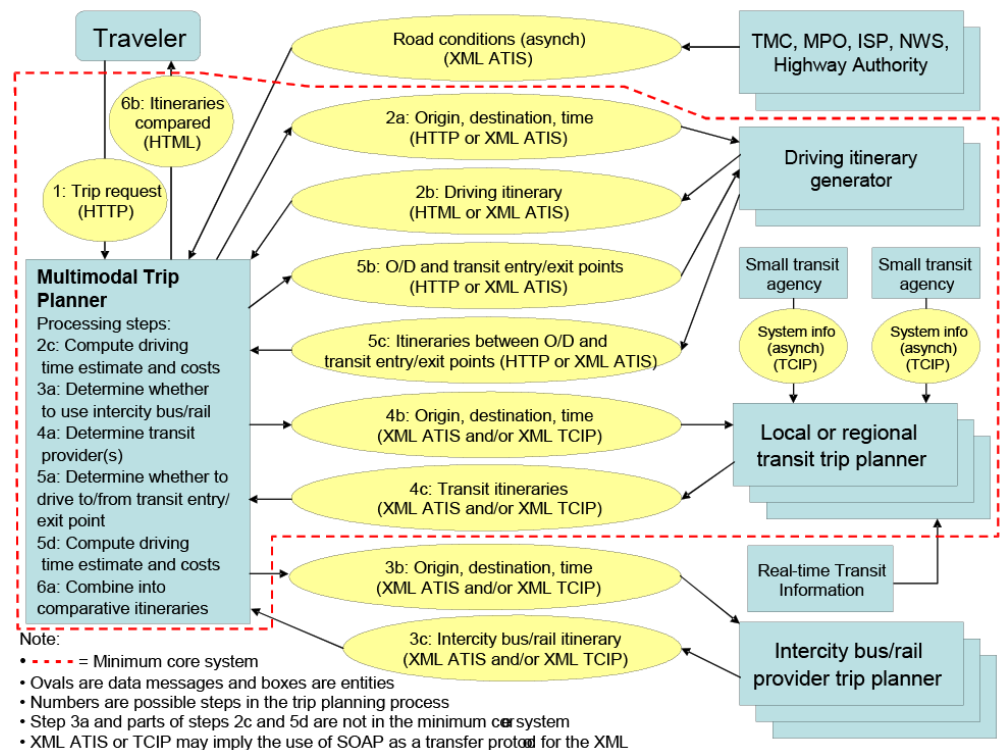
Section 508 Standards

Another standards-based objective of the Cooperative Agreement was to create a trip planning system that was “Section 508 compliant.” Section 508 refers to a broad set of regulations requiring accessibility of website and other electronic documents for persons with disabilities. These standards require compatibility with text-to-speech reader programs for the blind, compatibility with adjustable font-size browser controls for the partially blind, and compatibility with alternative input devices for persons with limited dexterity. RTA conducted Section 508 compliance testing on the MMTPS and confirmed adherence to this standard.

Implementation Overview

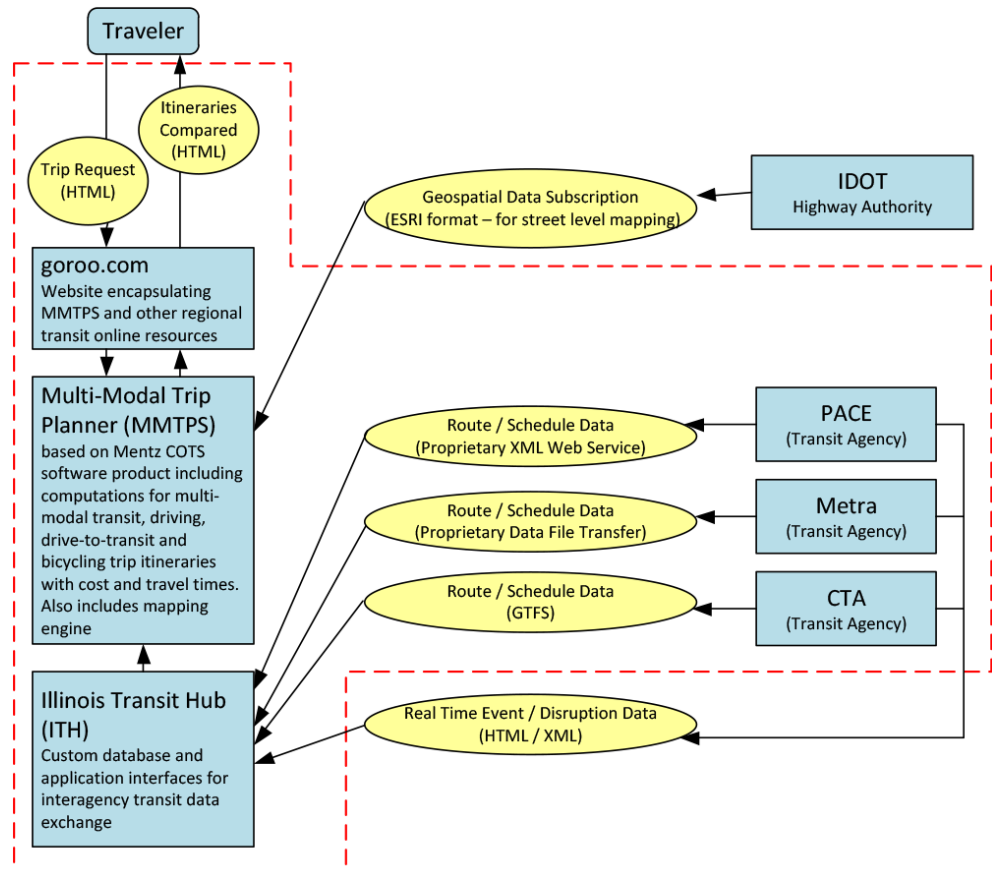
As presented earlier in this report, the MMTPS successfully achieved almost all functional objectives originally envisioned by FTA in its 2004 RFP. However, the as-built system used to achieve these objectives differed substantially from the system envisioned by FTA in 2004. The system diagram shown in Figure 5-1 was included in the original 2004 RFP document. It depicts the envisioned MMTPS as a message-driven system that accepts user requests and queries with several integrated trip planning and calculation engines to present the best combined multi-modal trip itineraries back to the user.

Figure 5-1
As-Envisioned
System Diagram
(from FTA RFP)



The system diagram in Figure 5-2 represents the MMTPS as it was actually built. It depicts the Mentz COTS system as a fully functional multi-modal trip planning engine built on a single unified data warehouse called the Illinois Transit Hub (ITH), which is updated asynchronously from multiple interagency data sources.

Figure 5-2
As-Built
System Diagram



The ITH was a pre-existing asset of RTA before the start of engineering efforts for the MMTPS project. The ITH receives and disseminates a full range of transit information, both static (infrequently-changing) and real-time information via connections with the three RTA service board agencies—CTA, Metra, and Pace. The CTA interface originally used Simple Object Access Protocol (SOAP), a transfer protocol for XML, to supply data to the ITH. CTA chose to migrate to GTFS in 2009 as part of its independent effort to enable Google Transit in Chicago. Pace also used SOAP to provide data to the ITH, but Pace uses a proprietary XML format. The ITH never achieved automated access to Metra’s data sources and, therefore, Metra’s static data are supplied to the ITH through the transfer of proprietary delimited files.

SECTION
6

Analysis of MMTPS Market Penetration

A stated goal of the operational test was to “evaluate use of the trip planner to gain a better understanding of the design and marketing necessary to achieve the vision.”

Original Marketing Plan

In early 2008, RTA contracted with DLLM Marketing to produce a marketing plan. The plan was designed for a multi-pronged marketing push to coincide with the launch of the new system. In 2008, it was not entirely known that it would be more than one year until the beta release of the system, that the full production system would not be released to the public until October 2010, and that multiple enhancements and features would come online in subsequent releases through 2012. As a result, the full marketing plan was not executed in its entirety because there was never a clear-cut system launch to tie to it. Instead, the system was launched incrementally, and marketing efforts were conducted incrementally at a similar pace.

Table 6-1 lists the key activities of the 2008 marketing plan and whether or not they were executed in the following years.

Table 6-1
*Status of MMTPS
Marketing Activities*

Planned Activity (From DLLM 2008 Marketing Plan)	Executed?
Select a compelling system name and logo (the Volpe report research infers that the selection of “goroo.com” as the name did not achieve the desired results; the report did not attempt to measure the effectiveness of the goroo.com name)	Yes
Install banners and links on websites of MMTPS project partners (IDOT, CTA, Metra, Pace, etc.)	Yes
Search engine submittal, search engine optimization	Yes
Online promotion or sweepstakes for first month to encourage visitors	No
Email newsletters announcing system updates to individuals already on RTA-controlled e-mail lists	Yes
Viral marketing on Facebook, MySpace, etc.	No
Promotion on regional transit-related blogs	No
Leverage stakeholder agency communication and marketing departments to promote media coverage.	Partial
Stage media event to promote television news coverage	No
Disseminate news releases to print media, not just at launch but when features are added and when nth trip plan is generated	Partial
Purchase 10- and 15-second radio commercials in local market	No
Advertise on unsold bus/train interior and exterior ad space	No
Advertise on Pace vanpool wraps	No

Table 6-1
(continued)
Status of MMTPS
Marketing Activities

Planned Activity (From DLLM 2008 Marketing Plan)	Executed?
Produce low-cost commercials to run on TVs installed on Pace buses	No
Create brochures for convention and trade show attendees	No
Conduct speaking engagements coordinated with public advocacy groups such as environmental protection and clean air groups	No
Seek sponsorships from businesses who will give discounts to customers who print out and present their MMTPS trip plans	No
Seek out partnerships with other Chicago-focused Web publications (Metromix, etc.) to link to MMTPS as their “Get Directions” utility	Yes

Search Engines

The search engine optimization and registration activities were low-cost and were particularly effective. The MMTPS is now a Top 3 result on Google, Bing, and Yahoo for the most closely-related search terms such as “RTA” and “Chicago Transit directions.” For other partially-relevant search terms such as “Chicago bus routes,” the MMTPS did not appear on the coveted Top 10 (first page) of results but, in all such cases, one of its referral agency websites appeared in the Top 3 results.

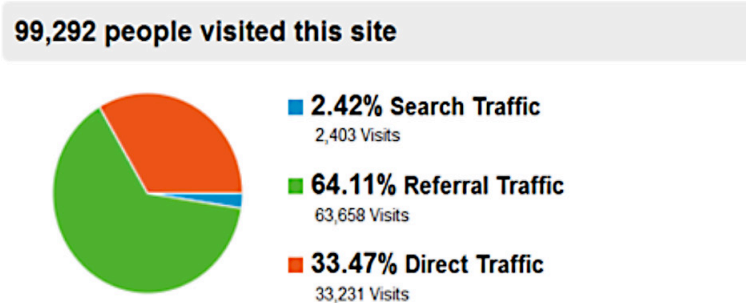
Referral Sites

One of the most effective and least costly marketing activities was to coordinate with the webmasters of the three services boards (CTA, Metra, Pace) and RTA to prominently display banner links to MMTPS/goroo.com on the main page. For CTA and RTA, these links allow the user to enter his/her start and end points on the referring page and link directly to the results page, thus saving extra clicks. There is more untapped potential from Pace and Metra referrals. As shown in Figure 6-1 (middle panel), Pace promotes its own primitive text search of route names ahead of the fully-featured MMTPS. Metra does not link to the MMTPS on its main page. Figure 6-1 shows CTA, Pace, and RTA referral controls.

Figure 6-1
Page Links from
Referring Transit
Websites

The agency home page links to the MMTPS are very effective. A total of 64.11 percent of all traffic to the MMTPS came from page referrals as seen during this three-week snapshot taken in late 2011.

Figure 6-2
Sources of Traffic to
MMTPS Web Site



Marketing Activities Not Executed

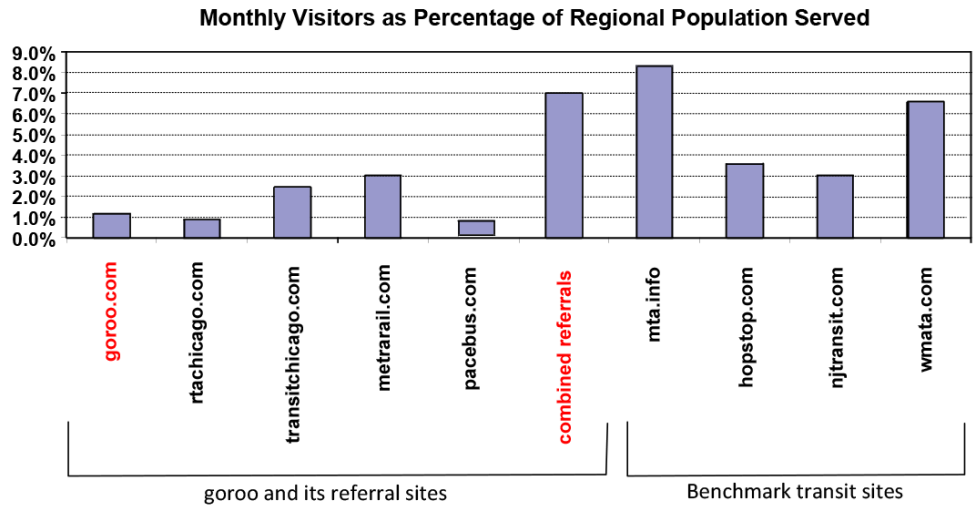
RTA had valid reasons for skipping certain activities proposed in the original marketing plan. Because the initial launch was a beta release with known deficiencies and feature gaps, it was decided that the initial promotion would be muted. In particular, the social media and blog promotions were skipped where users might overwhelm the discussion with negative posts about the known deficiencies and feature gaps before they could be corrected. The higher-cost activities such as radio advertisements and media events were never executed because there was never a clear-cut launch of full functionality that would justify the costs.

Marketing Effectiveness

The marketing activities that were executed were still very effective, even if scaled back. The two-year-old MMTPS site receives visitors at a similar order-of-magnitude as the long-established transit sites in the Chicago region. When considering that the MMTPS is a single-purpose self-service site for trip planning, it measures very well against sites used for fare account management and all purposes for the agency such as CTA's transit Chicago.com site. The combined traffic to sites that have home page links to the MMTPS compares well with traffic to benchmark sites in the New York City and the Washington DC regions.

Figure 6-3

Comparison of Website Traffic to Different Public Transit Websites



SECTION 7

Conclusions

After seven years, the original functionality envisioned for the MMTPS system was ultimately achieved or surpassed under the Cooperative Agreement between FTA and RTA. The system is serving a large portion of the regional population and is likely having a positive effect on ridership. The tool allows users to view the systems of three distinct transit agencies as a seamless unified transit system. Users who might have been intimidated or discouraged from taking public transit because their routes involved complex bus/rail transfers or disconnected route maps and schedules may now feel more comfortable choosing public transit. Use of the system is substantial despite minimal marketing efforts. If RTA were to undertake some of the marketing activities it had considered in the past, usage levels and effects on ridership could increase even further.

As an operational test for the application of ITS/XML data exchange standards, the project did not satisfy its objectives. After significant analysis, RTA concluded that the cost of converting pre-existing systems to use largely incompatible ITS standards would have added more than \$1 million to the cost of the MMTPS. The project did show that the GTFS data formats promoted by Google, Inc. and adopted by CTA could be successfully used for multi-agency transit system integration.

As a model for other transit agencies, the project offers a solution that is certainly viable but potentially too costly to justify. In theory, if another agency reused the system integration efforts of RTA as a starting point, the project could be reproduced on a much shorter timeline and much smaller budget. But the RTA solution was dependent on the pre-existing Illinois Transit Hub database, which had its own costs outside of the MMTPS project budget. Even if RTA furnished its intellectual property free of charge to other regional transit agencies, there would still be costs associated with the infrastructure, data conversion, customized implementation, and purchase of the COTS software licenses. This cost should be evaluated alongside the option of deferring to the ostensibly free Google Transit product. The Google Transit application can be quickly brought online in any region whose transit agency executes a project to convert and host its schedule and route data on the GTFS formats. While the cost of such a project is considerably less expensive than the MMTPS project cost, RTA's solution offers several advantages: RTA's MMTPS has a more complete feature set than that of Google Transit, its solution is proven in a region served by multiple overlapping transit agency systems, and it is entirely controlled by the public sector and does not rely on the voluntary participation of a private company such as Google, Inc.

RTA's MMTPS is the only all-modal trip planner that serves the entire region, and it may be the only system in the U.S. that nearly matches the original functional objectives envisioned by FTA. The RTA MMTPS will continue to serve the Northeast Illinois region and promote increased ridership by making the multi-agency transit system more approachable and easier to use.

APPENDIX

Readers of this report can access the MMTPS directly at www.goroo.com.

Figure A-1 and A-2 are portions of screenshots taken of the MMTPS System in use. Shown are the availability of six different route options and their calculated arrival times, all transit, all driving, and drive-to-transit as well as an annotated map, calculated total distance, and calculated total trip cost. Wheelchair icons show which transit assets are accessible to persons with disabilities. The turn-by-turn directions of individual driving, bicycling, or walking segments are hidden to make the whole trip more understandable at first glance. These can be expanded, as shown in Figures A-3 and A-4. Note the availability of a bicycling and all-walking options; these are not enabled by default. As shown, the user has control over other trip preferences such as favoring accessible services, favoring stations with parking, avoiding tolls or highways, and limiting walking distances.

Figure A-1
 Screenshot of
 Seamless Trip Plan
 Involving a Bus Ride,
 Two Rail Lines, and
 Walking Segments

Directions from Mall Dr./Woodfield Rd. to CHICAGO MIDWAY AIRPORT

Please review the transportation options from each tab below and select the mode that will get you there the earliest (or the latest departure time), cheapest, greenest, or with least walking. If you want to adjust your trip plans, please click on Edit Your Trip.

Driving
Arrive: 9:50 AM

Drive to Bus & Train
Arrive: 10:44 AM

Bus & Train
Arrive: 11:02 AM

Bus & Train
Arrive: 11:02 AM

Bus & Train
Arrive: 11:32 AM

Bus & Train
Arrive: 12:02 PM

Total Travel Time: **130 Minutes**

Depart: **8:52 AM**

Arrive: **11:02 AM**

A Depart Mall Dr./Woodfield Rd. at 8:52 AM
[Attractions Near Your Departure](#)
 Sunny, 69 °F

Take Pace Bus 606
[Add to Preferred Routes](#)
 Depart at 8:52 AM: Woodfield Rd /Mall Dr.
 Arrive at 9:29 AM: Rosemont Cta Station
 Fares: \$1.75
 Distance: 10.1 Miles

Walk WEST
[Show Map](#) [Hide Turn-by-Turn Directions](#)
 ↑ KEEP STRAIGHT
 Distance: <0.01 Miles

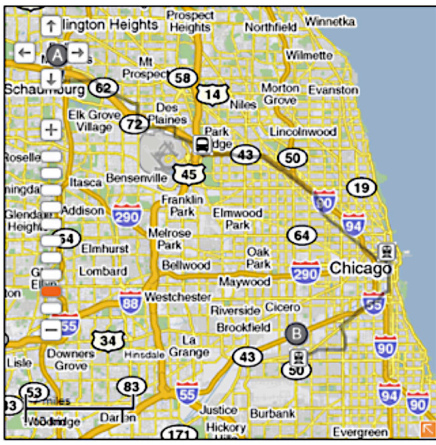
Take CTA Train Blue Line (Forest Park - UIC)
[Add to Preferred Routes](#)
 Depart at 9:48 AM: Rosemont
 Arrive at 10:23 AM: Clark
 Fares: \$2.25
 Distance: 13.6 Miles

Take CTA Train Orange Line (Midway)
[Add to Preferred Routes](#)
 Depart at 10:29 AM: Clark
 Arrive at 10:57 AM: Midway
 Fares: Free Transfer
 Distance: 8.8 Miles

Walk NORTH
[Show Map](#) [Hide Turn-by-Turn Directions](#)
 ↑ KEEP STRAIGHT on Skybridge
 Distance: <0.01 Miles

B Arrive CHICAGO MIDWAY AIRPORT at 11:02 AM
[Attractions Near Your Destination](#)
 Sunny, 68 °F

[Print Directions](#) [Email](#) [Help](#)



Transfers: **2**

Total Distance: **32.6 Miles** (32.5 Miles via Transit, 0.1 Miles via Walking)

Total Cost: **\$4.00** (\$4.00 for Fares)

[Find out how to reduce your transit fare.](#)
[Learn More @ drivelesslivemore.com](#)

Figure A-2

Screenshot of Alternative of Trip Plan Involving Driving and Multi-Modal Transit Segments

Directions from Mall Dr./Woodfield Rd. to CHICAGO MIDWAY AIRPORT

[Edit Your Trip](#)

Please review the transportation options from each tab below and select the mode that will get you there the earliest (or the latest departure time), cheapest, greenest, or with least walking. If you want to adjust your trip plans, please click on Edit Your Trip.

Driving
Arrive: 9:50 AM

Drive to Bus & Train
Arrive: 10:44 AM

Bus & Train
Arrive: 11:02 AM

Bus & Train
Arrive: 11:02 AM

Bus & Train
Arrive: 11:32 AM

Bus & Train
Arrive: 12:02 PM

Total Travel Time: **118 Minutes**

Depart: **8:46 AM**

Arrive: **10:44 AM**

A Depart Mall Dr./Woodfield Rd. at 8:46 AM

[Attractions Near Your Departure](#)

Sunny, 69 °F

P Drive EAST from E Woodfield Rd
[Show Map](#) [Show Turn-by-Turn Directions](#)

T Park and ride public transit at Itasca
Distance: <0.01 Miles

Take Metra Milwaukee District West Line (to Chicago)
[Add to Preferred Routes](#)
Depart at 9:10 AM: Itasca
Arrive at 9:38 AM: Grand/Cicero
Fares: \$4.75
Distance: 14.3 Miles

Take CTA Bus 54 (24th Pl)
[Add to Preferred Routes](#)
Depart at 9:48 AM: Cicero & Grand
Arrive at 10:14 AM: Cicero & 23rd Place
Fares: \$2.25
Distance: 4.5 Miles

Take CTA Bus 54B (Ford City)
[Add to Preferred Routes](#)
Depart at 10:25 AM: Cicero & 23rd Place
Arrive at 10:42 AM: Midway Orange Line Station
Fares: \$2.25
Distance: 4.3 Miles

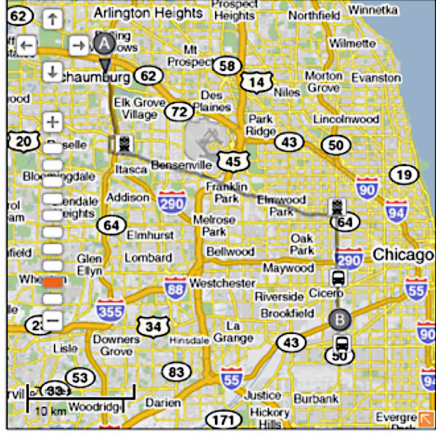
Walk WEST
[Show Map](#) [Show Turn-by-Turn Directions](#)

B Arrive CHICAGO MIDWAY AIRPORT at 10:44 AM

[Attractions Near Your Destination](#)

Sunny, 68 °F

[Print Directions](#) [Email](#) [Help](#)



Transfers: **2**

Total Distance: **29.7 Miles** (6.5 Miles via Driving, 23.2 Miles via Transit, 0.1 Miles via Walking)

Total Cost: **\$12.87** (\$9.25 for Fares, \$3.62 for Driving, \$0.00 for Toll)

[Find out how to reduce your transit fare.](#)

Help Improve Air Quality This option generates 9.8 lbs of carbon dioxide emission by car and 13.7 lbs by SUV! By taking transit, you will save 8.0 lbs of carbon dioxide emission by car and 12.0 lbs by SUV!

[Learn More @ drivelesslivemore.com](#)

Figure A-3

Screenshot Excerpt of Turn-by-Turn Directions of a Driving Segment Expanded

A Depart Mall Dr./Woodfield Rd. at 8:46 AM
[Attractions Near Your Departure](#)
 Sunny, 69 °F

P Drive EAST from E Woodfield Rd
[Show Map](#) [Hide Turn-by-Turn Directions](#)

- KEEP STRAIGHT on E Woodfield Rd
Distance: 0.4 Miles
- TURN RIGHT at W Frontage Rd
Distance: 0.4 Miles
- CONTINUE STRAIGHT
Distance: 0.1 Miles
- Take the ramp onto IL-53 S/I-290 E
Distance: 0.4 Miles
- CONTINUE STRAIGHT on I-290/IL-53
Distance: 2.8 Miles
- EXIT** Take Exit 5/Thorndale Ave
Distance: 0.2 Miles
- EXIT** Take Elgin-O'Hare Expresswayexit
Distance: 0.2 Miles
- CONTINUE STRAIGHT on Thorndale Ave/CR-26
Distance: 0.1 Miles
- TURN SHARP LEFT at IL-53/N Rohlwing Rd
Distance: 1.0 Miles
- TURN LEFT at W Irving Park Rd/IL-19
Distance: 0.9 Miles

T Park and ride public transit at Itasca
Distance: <0.01 Miles

Figure A-4

Screenshot Excerpt of Advanced Options that Allow User to Select Various Options

I want to Leave Arrive on 05/17/2019 at 9:30 AM

I prefer accessible services: Yes No

Transportation Mode Preferences

Train Bus Driving Drive to Transit Bicycling Walking

Riding Transit: I prefer stations with parking facilities: Yes No
 I prefer to walk no more than: 1 Miles
 I prefer directions that: are quickest

Driving: I prefer to avoid Toll Highway

GLOSSARY

The following acronyms and regional terms are used frequently throughout this report.

CTA – Chicago Transit Authority. Service Board that operates bus and light rail lines within the city limits of Chicago and its closest suburbs.

Google Analytics – A product offered by Google, Inc. that allows companies to track traffic to their public websites. This tool was used by RTA to analyze Web traffic to goroo.com and the MMTPS. This product has no relationship to Google Transit.

Google Transit – Developed by Google, Inc. as an extension to the Google Maps online tool for looking up driving directions. Google Transit allows users in some metropolitan regions to look up multi-modal public transit trip itineraries.

Goroo.com – The name of the RTA-operated website that encompasses the MMTPS along with other online regional transit resources.

GTFS – General Transit Feed Specification. Defines a common format for public transportation schedules and associated geographic information. GTFS “feeds” allow public transit agencies to publish their transit data and developers to write applications that consume that data in an interoperable way.

IDOT – Illinois Department of Transportation. Illinois’ state highway agency that cooperated with RTA on the MMTPS project.

ITH – Illinois Transit Hub. A data warehouse for receiving and disseminating public transit data between agencies under the oversight of RTA.

ITS – Intelligent Transportation Systems. Umbrella for multiple technical standards promoted by FTA and envisioned as a key part of the MMTPS project.

Mentz Datenverarbeitung GmbH – German company that provided the Commercial Off-The-Shelf (COTS) trip planner that was a key component of the MMTPS.

Metra Commuter Rail – Service Board that operates light rail lines radiating from Chicago’s downtown commercial district outward to communities in a large six-county region surrounding Chicago.

MMTPS – Multi-Modal Trip Planning System. The name of the project undertaken by RTA under Cooperative Agreement with FTA. Also the generic name of the system produced by the project and in use in the region.

Pace Suburban Bus – Service Board that operates a network of bus routes covering the surrounding suburbs of Chicago.

RTA – Regional Transportation Authority of Northeastern Illinois. A financial and budgetary oversight agency for all public transportation operating in the six-county region surrounding Chicago. This is the performing agency for the MMTPS project.

Service Boards – The term applied to the three individual transit agencies operating under the financial and budgetary oversight of RTA.



U.S. Department of Transportation
Federal Transit Administration

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<http://www.fta.dot.gov/research>