



# MOD SANDBOX DEMONSTRATIONS INDEPENDENT EVALUATION

## CTA INTEGRATED FARE SYSTEMS - FROM TRANSIT FARE TO BIKE SHARE PROJECT EVALUATION PLAN



U.S. Department of Transportation  
**Federal Transit Administration | ITS Joint Program Office**

Front Cover Image: UIG via Getty Images and Chicago Transit Authority (CTA), November 2018

Produced by Booz Allen Hamilton  
U.S. Department of Transportation  
Federal Transit Administration  
Office of the Assistant Secretary for Research and Technology, Intelligent Transportation  
Systems Joint Program Office

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**Technical Report Documentation Page**

<b>1. Report No.</b> <b>FHWA-JPO-18-696</b>		<b>2. Government Accession No.</b>		<b>3. Recipient's Catalog No.</b>	
<b>4. Title and Subtitle</b> Mobility on Demand (MOD) Sandbox Demonstrations Independent Evaluation (IE) - Chicago Transit Authority (CTA) Integrated Fare Systems - From Transit Fare to Bike Share Project Evaluation Plan				<b>5. Report Date</b> December 2018	
				<b>6. Performing Organization Code</b>	
<b>7. Author(s)</b> Gustave Cordahi, Susan Shaheen, Elliot Martin				<b>8. Performing Organization Report No.</b>	
<b>9. Performing Organization Name and Address</b> Booz Allen Hamilton 8283 Greensboro Drive McLean, VA 22102  Transportation Sustainability Research Center - UC Berkeley 2150 Allston Way #280 Berkeley, CA 94704				<b>10. Work Unit No. (TRAVIS)</b>	
				<b>11. Contract or Grant No.</b> DTFH61-12-D-00041	
<b>12. Sponsoring Agency Name and Address</b> U.S. Department of Transportation Federal Transit Administration Office of the Assistant Secretary for Research and Technology, ITS Joint Program Office 1200 New Jersey Avenue, SE Washington, DC 20590				<b>13. Type of Report and Period Covered</b> Final Report	
				<b>14. Sponsoring Agency Code</b>	
<b>15. Supplementary Notes</b> Steven Mortensen, FTA Task Manager Robert Sheehan, ITS JPO Task Manager					
<b>16. Abstract</b> The Mobility on Demand (MOD) Sandbox Demonstration Program provides a venue through which integrated MOD concepts and solutions – supported through local partnerships – are demonstrated in real-world settings. For each of the 11 MOD Sandbox Demonstration projects, the MOD Sandbox Independent Evaluation includes an analysis of project impacts from performance measures provided by the project partners, as well as an assessment of the business models used.  This report constitutes the Evaluation Plan for the Chicago Transit Authority (CTA) Integrated Fare Systems - From Transit Fare to Bike Share Sandbox project. It includes the following chapters: project overview; evaluation approach and process; evaluation schedule and management; and data collection & analysis plan.					
<b>17. Keywords</b> Mobility on demand, MOD, sandbox, shared mobility, bike sharing, mobility as a service, independent evaluation, transit			<b>18. Distribution Statement</b>		
<b>19. Security Classif. (of this report)</b>		<b>20. Security Classif. (of this page)</b>		<b>21. No. of Pages</b> 50	<b>22. Price</b>

# Table of Contents

<b>Project Overview</b> .....	<b>1</b>
Introduction .....	1
Project Scope .....	1
Key Partners .....	2
Project Timeline .....	2
<b>Evaluation Approach and Process</b> .....	<b>3</b>
Project Goals .....	3
Evaluation Hypotheses.....	4
Performance Metrics .....	4
Data Types, Elements, and Sources .....	5
Data Types and Elements.....	5
Data Sources .....	6
Data Sources Mapping.....	7
Methods of Evaluation .....	7
Evaluation Logic Model .....	8
Documentation and Reporting .....	12
<b>Evaluation Schedule and Management</b> .....	<b>13</b>
Evaluation Schedule.....	13
Roles and Responsibilities .....	13
Data Transfer and Storage.....	14
Data Collection Responsibilities.....	14
Risk Management.....	15
Schedule .....	15
Data Quality Assurance.....	16
<b>Data Collection and Analysis Plan</b> .....	<b>18</b>
Detailed Data Collection and Analysis Plan by Evaluation Hypothesis.....	21
<b>Appendix A. Selected Draft Survey Questions: <i>Retrospective Survey</i></b> .....	<b>30</b>
<b>Appendix B. Selected Draft Survey Questions: <i>Recent Trip Survey</i></b> .....	<b>43</b>

**List of Tables**

Table 1. Project Goals, Evaluation Hypotheses, Performance Metrics, and Data Types and Sources for the CTA Sandbox Project ..... 9

Table 2. Data Type and Data Collection Responsibilities for CTA MOD Sandbox Evaluation..... 15

Table 3. Data Type and Risk Mitigation Strategies CTA Sandbox Evaluation ..... 17

Table 4. Data Type, Data Elements, Period of Collection, Collection Responsibility and Mechanisms, and Hypothesis Alignment ..... 19

Table 5: Suggested Interviewee Name, Role/Affiliation, and Contact Info ..... 29

**List of Figures**

Figure 1. Mapping of Data Sources, Data Sets, and Performance Measures..... 7

Figure 2. MOD Sandbox Evaluation and Demonstration Schedule..... 13

Figure 3. CTA Data Collection Framework..... 14

# Project Overview

This chapter gives a brief introduction to the Chicago Transit Authority (CTA) Mobility on Demand (MOD) Sandbox project that will be evaluated through this independent evaluation.

## Introduction

The CTA operates the nation's second largest public transportation system and is the provider of bus and heavy rail services in the Chicago region. The CTA is a regional transit system that serves 35 suburbs, in addition to the City of Chicago, and provides 83 percent of the public transit trips in the six-county Chicago metropolitan area either with direct service or connecting service to Metra and Pace Suburban Bus.

In 2013, the CTA introduced customers to Ventra, the contactless, open fare payment system. This account-based system is also used by CTA's sister agencies, Metra (commuter railroad) and Pace (suburban bus lines) and provides seamless connectivity between these regional service providers. In 2015, the Ventra App was launched, which allows customers to purchase fare media, manage accounts, and track train and bus arrivals from their phone. Since the launch, the Ventra App has been downloaded by 3.7 million customers. It is the primary payment method for many of CTA's transit customers. Recent enhancements to the system include the use of mobile wallets (Apple Pay) within the App to purchase transit value or passes.

## Project Scope

CTA has partnered with the Chicago Department of Transportation (CDOT), whose customers have access to more than 580 Divvy Bike Share stations and over 5,800 bikes located throughout the region; this includes the ability to make connections to Divvy at 75 percent of CTA's rail stations and nearly 50 percent of CTA's bus stops. These connections greatly increase CTA's reach throughout the Chicago metropolitan region. Divvy bikes are used by commuters, tourists and recreational riders for convenient and healthy trips around the downtown, in 44 city neighborhoods, and in 2 suburbs. To increase access to the bike sharing program, Divvy has recently placed 65 new stations in 12 primarily low-income neighborhoods and developed an alternative fee structure to encourage ridership.

With CTA's partners (CDOT, Cubic and Divvy), CTA has proposed two modifications to the Ventra App that will allow customers to more easily access Divvy bikes and establish a platform to expand this opportunity to other ride sharing modes of transportation in the future.

1. Phase 1 of the project will incorporate Divvy bike station locations and status into the Ventra trip planner so that customers can identify, in real-time, the availability of a bike at their transit stop, or the availability of a docking station at the destination of their bike trip. The initial phase will also include a Deep Link to the existing Divvy App so that new customers can create a Divvy account, and existing Divvy members will be able to obtain a bike unlock code.

2. Phase 2 will further integrate Divvy functionality into the Ventra App so that customers can pay for their Divvy bike with their Ventra transit value or other payment source to receive an unlock code. This is a major innovation for customers to have the ability to use Ventra transit value to pay for other ride sharing modes. Once this process has been successfully integrated, the payment process can be readily expanded to other modes.

The implementation of this project expands the transit network from traditional bus, train, and commuter rail modes to other ride sharing options. Once these processes have been implemented and put into practice, this payment procedure can be readily expanded to car sharing or other transportation modes.

## Key Partners

The CTA is partnering with CDOT, Cubic, and Divvy.

## Project Timeline

The main project milestones are captured in the timeline below. Please note that the evaluation timeline is provided in a later chapter of this report.

1. **January 23<sup>th</sup>, 2017** – Execution Date
2. **December 2018** – Phase 1: Trip Planner and Deep Integration and Demonstration Start (Begin Data Collection)
3. **June 2019** – Phase 2: Divvy Payment Functionality
4. **December 2019** – Demonstration Complete (Complete Independent Evaluation Data Collection)
5. **January 2020** – Final Project Report

The CTA team will collect data relevant to this MOD Sandbox Demonstration (as outlined in this Evaluation Plan) between December 2018 and December 2019, and will share the data with the Independent Evaluation (IE) team for conducting the evaluation. More details on the data collection planning are provided in Chapters 3 and 4 of this report.

# Evaluation Approach and Process

For each of the 11 MOD Sandbox projects, the IE team developed an evaluation framework in coordination with each project team—the framework is a project-specific logic model that contains the following entries:

1. **MOD Sandbox Project** – Denotes the specific MOD Sandbox project.
2. **Project Goals** – Denotes each of the project goals for the specific MOD Sandbox project. The project goals capture what each MOD Sandbox project is trying to achieve.
3. **Evaluation Hypothesis** – Denotes each of the evaluation hypotheses for the specific MOD Sandbox project. The evaluation hypotheses flow from the project-specific goals.
4. **Performance Metric** – Denotes the performance metrics used to measure impact in line with the evaluation hypotheses for the specific MOD Sandbox project.
5. **Data Types, Elements, and Sources** – Denotes the Data Types, Elements, and Data Sources used for the identified performance metrics.
6. **Method of Evaluation** – Denotes the quantitative and qualitative evaluation methods used.

This chapter details the evaluation approach and process, as finalized in the evaluation logic model for the CTA MOD Sandbox project. This includes listing project goals, evaluation hypotheses, performance metrics, data types and elements, data sources, and methods of evaluation.

## Project Goals

The project goals denote what CTA aims to achieve through the MOD Sandbox demonstration. These project goals include the following:

1. Increase awareness of Divvy among public transit users in Chicago
2. Enable Divvy users to pay for bike-sharing using the Ventra App
3. Add Divvy bike station location and status information to Ventra, allowing customers to see station status in real time
4. Enable increased bike-sharing usage by transit users for egress trips from CTA and Metra systems
5. Enable increased bike-sharing usage by transit users for access trips to CTA and Metra systems
6. Enhance the multimodal transit experience and extend the regional transit network
7. Increase overall satisfaction with public transit in Chicago
8. The Ventra App will improve access to locations in Chicago and connectivity to public transit for the general population of users
9. The Ventra App will improve access to locations in Chicago and connectivity to public transit for low-income travelers and for travelers with disabilities
10. Produce lessons learned through stakeholder interviews.

The project goals set the foundation for the evaluation hypotheses.

## Evaluation Hypotheses

The evaluation hypotheses flow from the project-specific goals and denote what should happen if each project goal is met. These evaluation hypotheses include the following:

1. At least 30 percent of people using the Ventra App report an increased awareness of Divvy.
2. (a) At least 5 percent of Ventra App users who also use Divvy, have used the app to pay for Divvy.  
(b) At least 5 percent of Ventra App users report that using Ventra to pay for Divvy is a useful feature.
3. At least 5 percent of Ventra App users report that seeing Divvy on the Ventra App is a useful feature.
4. Bike-sharing use by Ventra App users increases for egress trips from public transit
5. Bike-sharing use by Ventra App users increases for access trips to public transit
6. Ventra App users ride public transit more due to the bike-sharing trip planning and payment features of the Ventra App.
7. The new Ventra App features raise the overall satisfaction and comfort of users with public transit in Chicago
8. Ventra App users report greater access to locations in Chicago and connectivity to public transit due to the new features of the app
9. (a) Ventra App users who are low-income report greater access to locations in Chicago and connectivity to public transit due to the new features of the app  
(b) Ventra App users who are people with disabilities report greater access to locations in Chicago and connectivity to public transit due to the new features of the app
10. The process of deploying the project will produce lessons learned and recommendations for future research.

The success of each evaluation hypothesis is measured by the performance metrics below.

## Performance Metrics

The performance metrics are used to measure impact in line with the evaluation hypotheses for the CTA MOD Sandbox Project's IE. These performance metrics include the following:

- Reported awareness and perception of Divvy by Ventra App users
- Number of Ventra App users who have used Divvy and paid for Divvy using the App at least once as a percentage of active total users
- Reported utility of paying for Divvy using the Ventra App
- Reported utility of seeing Divvy stations and bicycles on the Ventra App
- Use of Divvy by Ventra App users at the end of the transit trip

- Use of Divvy by Ventra App users at the beginning of the transit trip
- Public transit ridership change by Ventra App users
- Level of satisfaction with public transit by Ventra App users
- Reported perception of change in access to locations in Chicago and connectivity to public transit by Ventra App users
- Reported perception of change in access to locations in Chicago and connectivity to public transit by Ventra App users who are low-income
- Reported perception of change in access to locations in Chicago and connectivity to public transit by Ventra App users who have disabilities
- Qualitative documentation from stakeholder interviews.

The performance metrics will draw from a set of data sources that are specific to the project.

## Data Types, Elements, and Sources

### Data Types and Elements

The following data types and elements are used for computing the performance metrics that are defined for this evaluation:

#### 1. Survey Data

##### ***Retrospective Survey:***

- User demographics and socioeconomics
- Vehicle ownership
- Individual travel patterns (before and after launch of app integrations, with a focus on Divvy use)
- Current travel needs and mobility
- Impacts of Ventra App integrations on travel behavior, mobility, and access
- Recent trip attributes
- Location of home and work
- Change in awareness and perception of Divvy
- Experience and usefulness of using the Ventra App to pay for Divvy
- Satisfaction with Ventra App users
- Disability status

##### ***Recent Trip Survey:***

- Whether they would have still used Divvy had the Ventra App not contained Divvy information or payment capabilities
- Mode that would have been used in the absence of Divvy
- Trip purpose

- Whether the trip connected to or from public transit
- 2. Ventra App Payment and Activity data (for Ventra App users who have used Divvy)**
    - De-identified User ID
    - Date and Time stamp
    - User Latitude
    - User Longitude
    - Payment amount (if applicable)
    - Institution receiving payment (if applicable)
    - Present mode of travel (if known)
  - 3. Divvy bike-share utilization data**
    - Trip start day and time
    - Trip end day and time
    - Trip start station
    - Trip end station
    - Rider type (Member, Single Ride, and Explore Pass)
    - If a member trip, it will also include member's gender and year of birth
  - 4. Transit Ridership Data (CTA and Metra Ridership)**
    - Unlinked trips by route by hour (or by day if hour is not available)
    - For rail lines, origin and destination station pairs would be helpful
  - 5. Stakeholder Interview Data**

Please note that there is no one-to-one matching between the performance measures and the data types and elements. The mapping between performance measures and data types and elements are demonstrated in the evaluation logic model provided later in this chapter.

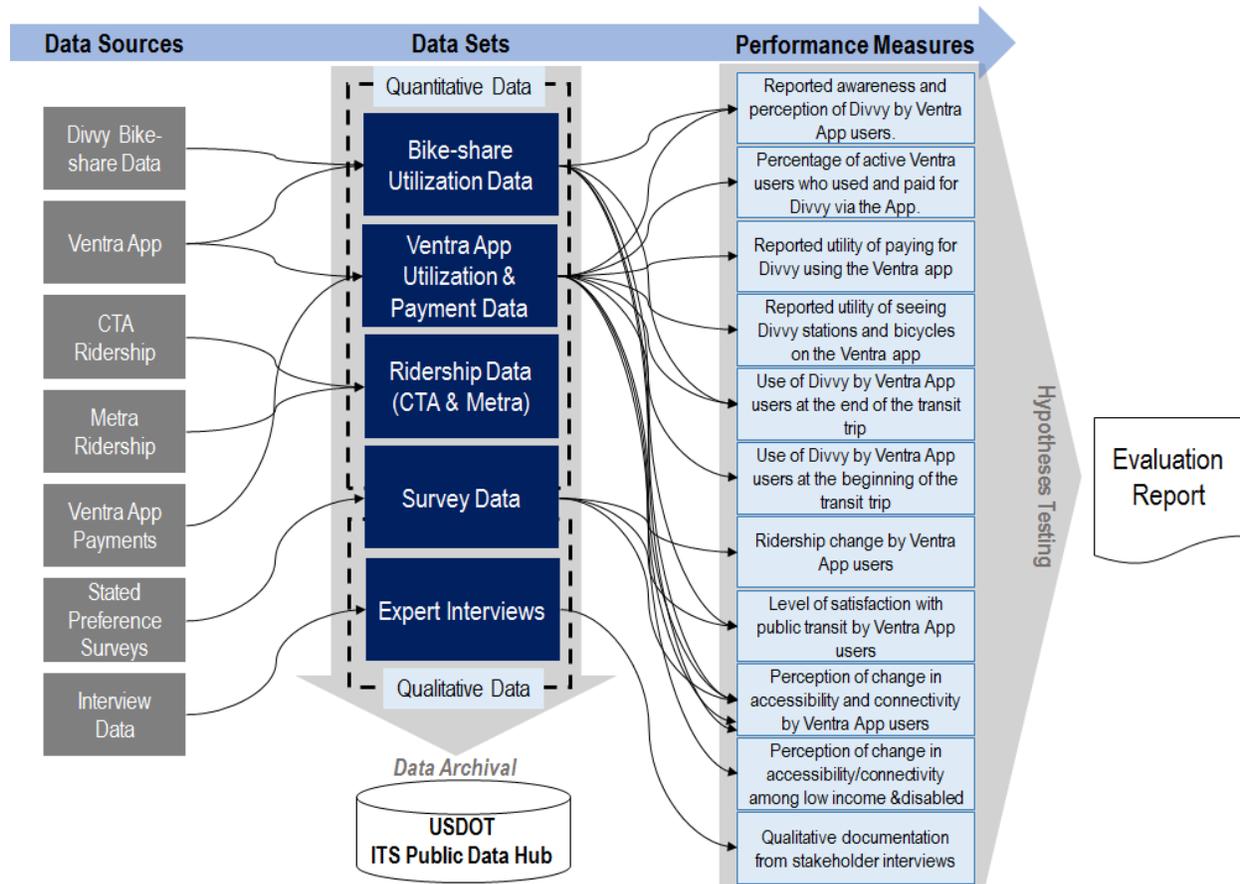
## Data Sources

The following sources are used for the performance metrics that are defined for the CTA IE:

- Survey data (Ventra App users)
- Ventra App payment and activity data (for Ventra App users who have used Divvy) provided by Ventra
- Bike-share utilization data provided by Divvy
- Transit ridership data provided by CTA and Metra
- Stakeholder interviews.

## Data Sources Mapping

Figure 1 shows the mapping of data sources, data sets, and performance measures that will be used in the IE of the CTA MOD Sandbox Demonstration. As shown, the datasets include both quantitative and qualitative data, and will be submitted to the U.S. Department of Transportation (USDOT) ITS Public Data Hub.



Source: Booz Allen Hamilton, December 2018

Figure 1. Mapping of Data Sources, Data Sets, and Performance Measures

## Methods of Evaluation

The quantitative and qualitative evaluation methods used in the CTA IE include the following:

- Time series and cross-sectional analysis
- Statistical analysis
- Survey analysis
- Survey and activity data analysis
- Summary of expert interviews.

Further details about the analysis methods by evaluation hypothesis are provided in Chapter 4.

## Evaluation Logic Model

Table 1 represents an extract from the final CTA evaluation logic model. Building on the project goals, the logic model lists evaluation hypotheses, performance metrics, and data types and sources for the CTA evaluation project.

**Table 1. Project Goals, Evaluation Hypotheses, Performance Metrics, and Data Types and Sources for the CTA Sandbox Project**

#	Project Goals	Evaluation Hypothesis	Performance Metric	Data Types	Data Sources
1	Increase awareness of Divvy among public transit users in Chicago	At least 30% of people using the Ventra App report an increased awareness of Divvy	Reported awareness and perception of Divvy by Ventra App users	Survey Data	Ventra App users (surveys)
2	Enable Divvy users to pay for bike-sharing using the Ventra App	a) At least 5% of Ventra App users who also use Divvy, have used the app to pay for Divvy	Number of Ventra App users who have used Divvy and paid for Divvy using the App at least once as a percentage of active total users	Survey Data App Payment and Activity data (for Ventra App users who have used Divvy)	Ventra App users (surveys) Ventra App data
		b) At least 5% of Ventra App users report that using Ventra to pay for Divvy is a useful feature	Reported utility of paying for Divvy using the Ventra App	Survey Data	Ventra App users (surveys)
3	Add Divvy bike station location and status information to Ventra, allowing customers to see station status in real time	At least 5% of Ventra App users report that seeing Divvy on the Ventra App is a useful feature	Reported utility of seeing Divvy stations and bicycles on the Ventra App	Survey Data	Ventra App users (surveys)
4	Enable increased bike-sharing usage by transit users for egress trips from CTA and Metra systems	Bike-sharing use by Ventra App users increases for egress trips from public transit	Use of Divvy by Ventra App users at the end of the transit trip	Survey Data App Payment and Activity data (for Ventra App users who have used Divvy) Bike-share utilization data Transit ridership data	Ventra App users (surveys) Ventra App data Divvy CTA and Metra

#	Project Goals	Evaluation Hypothesis	Performance Metric	Data Types	Data Sources
5	Enable increased bike-sharing usage by transit users for access trips to CTA and Metra systems	Bike-sharing use by Ventra App users increases for access trips to public transit	Use of Divvy by Ventra App users at the beginning of the transit trip	Survey Data App Payment and Activity data (for Ventra App users who have used Divvy) Bike-share utilization data Transit ridership data	Ventra App users (surveys) Ventra App data Divvy CTA and Metra
6	Enhance the multimodal transit experience and extend the regional transit network	Ventra App users ride public transit more due to the bike-sharing trip planning and payment features of the Ventra App	Public transit ridership change by Ventra App users	Survey Data App Payment and Activity data (for Ventra App users who have used Divvy) Bike-share utilization data Transit ridership data	Ventra App users (surveys) Ventra App data Divvy CTA and Metra
7	Increase overall satisfaction with public transit in Chicago	The new Ventra App features raise the overall satisfaction and comfort of users with public transit in Chicago	Level of satisfaction with public transit by Ventra App users	Survey Data	Ventra App users (surveys)
8	The Ventra App will improve access to locations in Chicago and connectivity to public transit for the general population of users	Ventra App users report greater access to locations in Chicago and connectivity to public transit due to the new features of the App	Reported perception of change in access to locations in Chicago and connectivity to public transit by Ventra App users	Survey Data	Ventra App users (surveys)

#	Project Goals	Evaluation Hypothesis	Performance Metric	Data Types	Data Sources
9	The Ventra App will improve access to locations in Chicago and connectivity to public transit for low-income travelers and for travelers with disabilities	a) Ventra App users who are low-income report greater access to locations in Chicago and connectivity to public transit due to the new features of the App	Reported perception of change in access to locations in Chicago and connectivity to public transit by low income App users	Survey Data	Ventra App users (surveys)
		b) Ventra App users who are people with disabilities report greater access to locations in Chicago and connectivity to public transit due to the new features of the App	Reported perception of change in access to locations in Chicago and connectivity to public transit by App users who have disabilities		
10	Produce lessons learned through Stakeholder interviews	The process of deploying the project will produce lessons learned and recommendations for future research	Qualitative documentation from stakeholder interviews	Stakeholder interview Data	Interviewees from project partners

## Documentation and Reporting

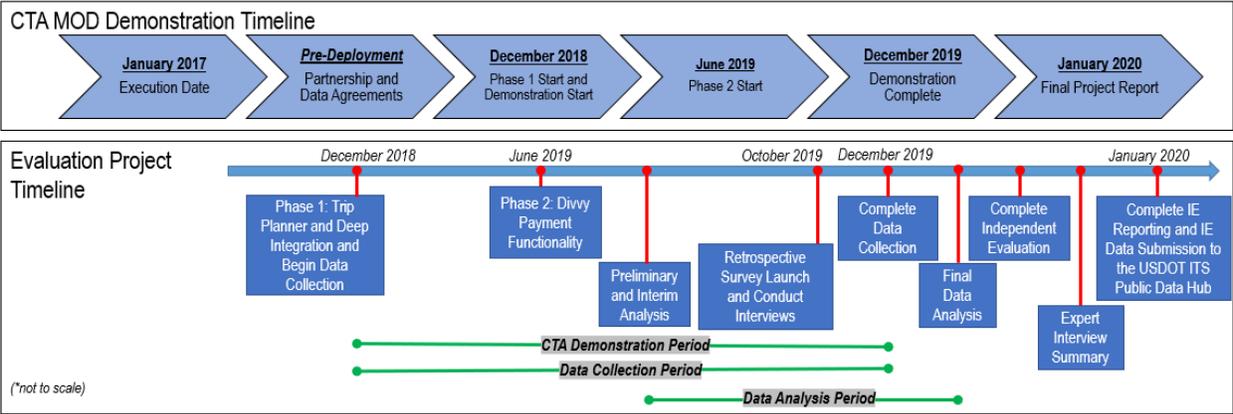
The IE team will develop an evaluation report for this MOD Sandbox demonstration project. The report will include a summary of major findings of the project in an Executive Summary section, followed by multiple sections providing details of the demonstration, evaluation hypotheses, data collected, analysis performed, findings, and results. The results will be reported through a mix of exhibits including tables, graphs, and charts.

# Evaluation Schedule and Management

This chapter provides details on the evaluation project schedule and other details on the management of the evaluation project.

## Evaluation Schedule

Figure 2 shows the IE schedule from the beginning of the quantitative and qualitative data collection that spans throughout the demonstration period and leads to the analysis, whose results are included in the site-specific evaluation report. Note that interim data spot checks and sample analyses will be performed during the demonstration period to proactively mitigate data-related risks.



Source: Booz Allen Hamilton, December 2018

Figure 2. MOD Sandbox Evaluation and Demonstration Schedule

Data relevant to the program will be collected between December 2018 and December 2019. This data will be shared with the IE team for evaluation purposes. More details on the data types, elements, and collection timeframes are provided in Chapter 4.

## Roles and Responsibilities

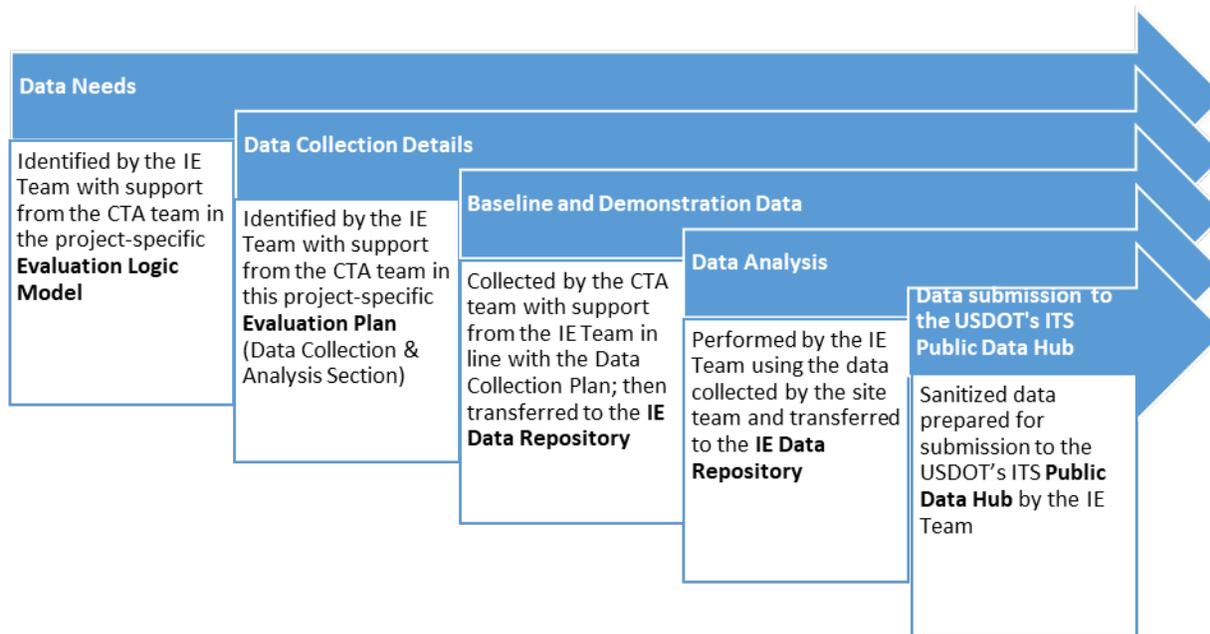
The three main entities involved in the evaluation and their corresponding high-level roles are as follows:

- **The site team** coordinates the collection of the requested evaluation data from the various project partners throughout the demonstration period, and transfers the data to the IE team
- **The IE team** supports the site team in the definition of the requested data elements, and performs the analysis using the data provided by the site team

- **The USDOT team** supervises the work and provides support for topics that encompass more than one site (e.g., coordination with transportation network companies who are partnering with several Sandbox sites).

## Data Transfer and Storage

Various types of qualitative and quantitative data sources are involved in the evaluation, as specified in Chapter 2. Figure 3 shows the overall data collection framework, including the steps and parties involved in data design, collection, transfer and storage.



Source: Booz Allen Hamilton, December 2018

Figure 3. CTA Data Collection Framework

## Data Collection Responsibilities

Table 2 denotes the data collection responsibilities for the various data types required for the evaluation.

**Table 2. Data Type and Data Collection Responsibilities for CTA MOD Sandbox Evaluation**

Data Type	Data Collection Responsibilities
Survey Data (Ventra App users)	<ul style="list-style-type: none"> <li>• The survey will be designed by the IE team, in collaboration with CTA.</li> <li>• The survey will be conducted by the IE team via the Qualtrics platform.</li> <li>• Survey links will be distributed via email by the CTA team.</li> </ul>
Ventra App Payment and Activity data (for Ventra App users who have used Divvy)	<ul style="list-style-type: none"> <li>• The CTA team will work with the Ventra App team to collect the data at periodic intervals and transfer them to the IE team for analysis. The data elements will be defined by the IE team in conjunction with CTA inputs.</li> </ul>
Divvy bike-share utilization data	<ul style="list-style-type: none"> <li>• The IE team will define the data elements needed for the analysis and will work with the CTA team to finalize this request.</li> <li>• The CTA team will work with the IE team to collect the required data.</li> </ul>
CTA and Metra ridership data	<ul style="list-style-type: none"> <li>• The CTA team will collect this data and will transfer it to the IE team for analysis. The CTA and IE teams will work together to identify the data elements and granularity of these datasets.</li> </ul>
Expert interviews	<ul style="list-style-type: none"> <li>• Interviewees are identified by the IE team in collaboration with the CTA team</li> <li>• The IE team is connected to the interviewees by the CTA team</li> <li>• The IE team conducts the expert interviews via phone or in person.</li> </ul>

## Risk Management

The IE team will continually monitor risk in an ongoing process throughout the demonstration period and identify the best resources within the team to address each risk. Some of the main risks involved in the evaluation are included below.

## Schedule

The IE team will maintain a demonstration tracking schedule to track and contact the demonstration teams for data and documentation. The team will keep an up-to-date integrated schedule that reflects updates from the site teams on a constant basis. Components of the evaluation reports will be created throughout the demonstration period, as the data and documentation for the project becomes available. The site team should inform the IE team of any changes in schedule that could affect the overall evaluation schedule (e.g. delays in the demonstration schedule).

## Data Quality Assurance

The IE team will perform spot checks on the data as it is being collected throughout the demonstration period to proactively manage risks related to data quality. This will allow the following:

- Avoiding insufficient data on performance of MOD demonstration to reliably estimate impacts and/or benefits.
- Addressing challenges in empirical data including lack of consistency, biases, and incompleteness.
- Identifying and controlling sources of error.
- Consideration of quality and quantity issues in data collection.
- Ensuring data privacy and proprietary protections in line with human subjects' protections
- Consideration of confounding factors.

Table 3 includes risk mitigation strategies that will be employed to ensure the availability of the requested data types for the evaluation.

**Table 3. Data Type and Risk Mitigation Strategies CTA Sandbox Evaluation**

Data Type	Risk Mitigation Strategies
Survey Data (Ventra App users)	<ul style="list-style-type: none"> <li>The CTA team will ensure maximum participation and anonymization of respondents through de-identified IDs (DEID). The IE team will design the survey that will be approved by the CTA team and the USDOT review team (<i>survey questions and suggested structures are provided in the appendix of this document</i>).</li> <li>Two of the hypotheses include extraction of survey results from low-income respondents and respondents with disabilities. The CTA team will ensure participation from self-disclosed community of low-income respondents and respondents with disabilities, and the IE team will utilize stratified weighting of results to make sure that these results are properly weighted in the analysis.</li> </ul>
Ventra App Payment and Activity data (for Ventra App users who have used Divvy)	<ul style="list-style-type: none"> <li>The CTA team will ensure that the data that is collected from the Ventra App is anonymized for use by the IE team.</li> <li>The IE team will clarify data needs and requirements prior to the demonstration so that all required data is collected.</li> </ul>
Divvy bike-share utilization data	<ul style="list-style-type: none"> <li>The CTA team and IE team will collaborate on what data is needed and what is available to assess the project hypotheses.</li> <li>Although the Divvy system uses open data standards associated with GBFS to share utilization data, the project team intends to isolate trips that are paid via the Ventra App. The current GBFS does not include payment method, and the CTA team might have to work with Divvy owners and operators to gather this data. If this does not work, the IE team will map Ventra App data regarding bike-share payments and match it with anonymized trip data from Divvy using time-stamps and station IDs.</li> </ul>
CTA and Metra Ridership Data	<ul style="list-style-type: none"> <li>The IE team will receive access to these data sets from the CTA team. Ridership data granularity will be defined based on conversations between CTA, Metra and the IE team.</li> </ul>
Expert Interviews	<ul style="list-style-type: none"> <li>The CTA team will facilitate the connection between the IE team and expert interviewees, and will help in getting their commitment to participate in the interviews</li> </ul>

# Data Collection and Analysis Plan

This chapter describes the plan for data collection and analysis for the CTA MOD Sandbox project. It summarizes the data that needs to be collected by the project, and how that data should to be processed for delivery to the IE team. Where possible, the IE team will take it upon itself to process data to conduct calculations necessary for the evaluation. The IE team will require data processing from the project team to produce the requested data format. The project team may also have to process data to remove any personally identifiable information (PII).

The data collection and analysis plan follows the logic model (Chapter 2) at the time of the plan composition. Each data field discussed is associated with a hypothesis and a performance metric. Certain types of data collected will address multiple hypotheses. In cases where the data structure is the same, the plan will refer to the data plan for a hypothesis that is already described. Most pilot-based data (data provided by project partners) should be provided from the beginning of the pilot demonstration period. The IE team also requests that some data from the CTA, such as ridership, be provided back to 2015 if possible. The request for longer time series of activity is motivated by the need to help discern potential background trends that could have been present before the project and then continue through it. Naturally, any data collected as a result of the project itself, can only be produced from the beginning of data collection by systems implemented by the project.

In the discussion that follows, the IE team presents the data structure that would be preferred, if possible. Other structures may be capable of delivering the same or similar insights and these structures can be discussed with the CTA project team. The IE team has specified the ideal structure where possible in the section that follows.

Table 4 summarizes the data types, data elements, collection periods, collection responsibility and mechanisms, and hypothesis alignment for the CTA Sandbox project evaluation. The table is followed by a more detailed data collection and analysis plan for each evaluation hypothesis.

**Table 4. Data Type, Data Elements, Period of Collection, Collection Responsibility and Mechanisms, and Hypothesis Alignment**

Data Type	Data Elements	Period of Collection	Collection Responsibility and Mechanisms	Hypothesis Alignment
Survey Data (Ventra App users)	<p><b>Retrospective Survey:</b></p> <ul style="list-style-type: none"> <li>• User demographics and socioeconomics</li> <li>• Vehicle Ownership</li> <li>• Individual travel patterns (before and after launch of app integrations, with a focus on Divvy use)</li> <li>• Current Travel Needs and Mobility</li> <li>• Impacts of Ventra App integrations on travel behavior, mobility, and access</li> <li>• Recent trip attributes</li> <li>• Location of Home and Work</li> <li>• Change in awareness and perception of Divvy</li> <li>• Experience and usefulness of using the Ventra App to pay for Divvy</li> <li>• Satisfaction with Ventra App users</li> <li>• Disability Status</li> </ul> <p><b>Recent Trip Survey:</b></p> <ul style="list-style-type: none"> <li>• Whether they would have still used Divvy had the Ventra App not contained Divvy information or payment capabilities</li> <li>• Mode that would have been used in the absence of Divvy</li> <li>• Trip purpose</li> <li>• Whether the trip connected to or from public transit</li> </ul>	<ul style="list-style-type: none"> <li>• The <b>Retrospective Survey</b> would ideally be implemented six months or more after project launch.</li> <li>• The <b>Recent Trip Survey</b> would be implemented soon after system launch, and extend throughout the demonstration period.</li> </ul>	<ul style="list-style-type: none"> <li>• Survey questions are developed by the IE team in collaboration with the CTA team (<i>draft survey questions are provided in Appendix A and Appendix B of this document</i>)</li> <li>• Surveys are conducted by the IE team via the Qualtrics platform</li> <li>• Survey links are distributed via email by the CTA team</li> </ul>	1, 2.a., 2.b., 3, 4, 5, 6, 7, 8, 9.a., 9.b.

Data Type	Data Elements	Period of Collection	Collection Responsibility and Mechanisms	Hypothesis Alignment
Ventra App Payment and Activity data (for Ventra App users who have used Divvy)	<ul style="list-style-type: none"> <li>• De-identified User ID</li> <li>• Date and Time stamp</li> <li>• User Latitude</li> <li>• User Longitude</li> <li>• Payment amount (if applicable)</li> <li>• Institution receiving payment (if applicable)</li> <li>• Present mode of travel (if known)</li> </ul>	The data collection period would cover the project performance period (beginning with the launch of the app integrations and ending at the end of the MOD Sandbox evaluation period)	<ul style="list-style-type: none"> <li>• Collected by the CTA team and transferred to the IE team</li> </ul>	2.a., 4, 5, 6
Divvy bike-share utilization data	<ul style="list-style-type: none"> <li>• Trip start day and time</li> <li>• Trip end day and time</li> <li>• Trip start station</li> <li>• Trip end station</li> <li>• Rider type (Member, Single Ride, and Explore Pass)</li> <li>• If a Member trip, it will also include Member's gender and year of birth</li> </ul>	Divvy data is requested from the start of the Divvy Program	<ul style="list-style-type: none"> <li>• Available to the IE team online via: <a href="http://www.divvybikes.com/system-data">www.divvybikes.com/system-data</a></li> </ul>	4, 5, 6
CTA and Metra ridership data	<ul style="list-style-type: none"> <li>• Unlinked trips by route by hour (or by day if hour is not available)</li> <li>• For rail lines, origin and destination station pairs would be helpful</li> </ul>	Ridership data is requested back to 2015.	<ul style="list-style-type: none"> <li>• Collected by the CTA team and transferred to the IE team</li> </ul>	4, 5, 6
Expert Interviews	<ul style="list-style-type: none"> <li>• Qualitative documentation from stakeholder interviews</li> </ul>	Stakeholder interviews should occur at least six months after the launch of the demonstration, but it may be conducted later, as long as it is within a maximum of two months after the end of the demonstration period	<ul style="list-style-type: none"> <li>• Interviewees are identified by the IE team in collaboration with the CTA team</li> <li>• The IE team is connected to the interviewees by the CTA team</li> <li>• The IE team conducts the expert interviews via phone or in person</li> </ul>	10

# Detailed Data Collection and Analysis Plan by Evaluation Hypothesis

**Hypothesis 1:** At least 30 percent of people using the Ventra App report an increased awareness of Divvy.

**Performance Metric:** Reported awareness and perception of Divvy by Ventra App users

## Data Types and Sources:

- **Survey of Ventra App users**

The default design of the survey is to be retrospective, administered to users after the system has launched and after they have used it. However, other designs are possible if they fit the nature of project launch. Below is a list of topics that the survey, regardless of design, will cover:

- User demographics and socioeconomics
- Vehicle ownership
- Individual travel patterns (before and after launch of app integrations, with a focus on Divvy use)
- Current travel needs and mobility
- Impacts of Ventra App integrations on travel behavior, mobility, and access
- Recent trip attributes
- Location of home and work
- Change in awareness and perception of Divvy
- Experience and usefulness of using the Ventra App to pay for Divvy
- Satisfaction with Ventra App users
- Disability status

The project and evaluation team would also like to consider the deployment of additional Recent Trip Survey, which probes users directly after select trips to gain a more direct measure of mode shift as a result of the system. The Recent Trip Survey is shorter and could ask up to 4 questions. It could ask about 1) Whether they would have still used Divvy had the Ventra App not contained Divvy information or payment capabilities, 2) the mode that would have been used in the absence of Divvy, 3) trip purpose, and 4) whether the trip connected to or from public transit.

## Data Collection Period:

The period of data collection will be from the start to the end of the project evaluation period for the survey. The survey will be implemented in accordance with the project timeline. The Retrospective survey would ideally be implemented six months or more after launch. The Recent Trip Survey would be implemented soon after system launch. The precise timeline is naturally dictated by the pace of the project and in coordination with the project team.

### **Analysis Procedure:**

Survey questions will probe the awareness and general perception of Divvy among Ventra App users. Questions will be included in the survey that explore whether awareness has increased as a result of the Ventra App integrations. The measurement of awareness will be measured using an ordinal scale response of relative awareness categories. The distribution of responses will be evaluated to ascertain whether 30% of sample respondents using the Ventra App felt that they had an increased awareness of Divvy as a result of the information presented by the Ventra App.

**Hypothesis 2a:** At least 5 percent of Ventra App users who also use Divvy, have used the app to pay for Divvy.

**Performance Metric:** Number of Ventra App users who have used Divvy and paid for Divvy using the App at least once as a percentage of active total users.

### **Data Sources:**

- **Survey of Ventra App users**

The survey(s) is to be implemented as described in Hypothesis 1.

- **Ventra App data (payments)**

The Ventra App data may have user and travel activity data that would be useful to the evaluation team to answer a number of questions. Data that can describe the payment and use of Divvy would be useful for evaluating the degree to which the Ventra App can impact behavior. This data would be most efficiently constructed as a combination of payment and travel activity data. The structure that follows is a proposed (draft) structure that would be useful for evaluating this hypothesis. The population of this data set consists of those Ventra App users who have used Divvy.

- De-identified User ID
- Date and Time stamp
- User Latitude
- User Longitude
- Payment amount (if applicable)
- Institution receiving payment (if applicable)
- Present mode of travel (if known)

This data could be structured in a couple of ways. The structure above comprises individual observations of locations of user activity.

### **Data Collection Period:**

The data collection period would cover the project performance period beginning with the launch of the app integrations and ending at the end of the evaluation period.

**Analysis Procedure:**

This hypothesis would be evaluated in a few ways. The survey would contain questions about the use of Divvy and the use of the Ventra App to pay for Divvy trips. These questions, when combined, would provide insight as to whether Divvy users that are also Ventra users apply Ventra in making payments to Divvy. The use of activity data would get at this question more directly with a broader evaluation of revealed activity in the population (as opposed to stated activity). Depending on the resolution of available activity data, the IE team may infer mode of travel, and use payment information to identify which modes are being used at a given time. Further discussion is needed with the project team to identify data that might be available from the Ventra App for evaluation of this hypothesis.

**Hypothesis 2b:** At least 5 percent of Ventra App users report that using Ventra to pay for Divvy is a useful feature.

**Performance Metric:** Reported utility of paying for Divvy using the Ventra App.

**Data Sources:**

- **Survey of Ventra App users**

The survey will be implemented as described in Hypothesis 1.

**Data Collection Period:**

The data collection period of the survey is as described in Hypothesis 1.

**Analysis Procedure:**

The survey will contain questions that probe the respondent on the relative usefulness of the Ventra App to pay for Divvy. The questions will be relatively simple as will the ordinal scale of responses. The analysis will only evaluate responses from those that have reported paying for Divvy and those that have reported using Divvy. The evaluation will determine whether respondents consider the feature of paying for Divvy to be useful.

**Hypothesis 3:** At least 5 percent of Ventra App users report that seeing Divvy on the Ventra App is a useful feature.

**Performance Metric:** Reported utility of seeing Divvy stations and bicycles on the Ventra App.

**Data Sources:**

- **Survey of Ventra App users**

The survey will be implemented as described in Hypothesis 1.

**Data Collection Period:**

The data collection period of the survey is as described in Hypothesis 1.

### **Analysis Procedure:**

The survey will contain questions that probe the respondent on the relative utility of seeing Divvy on the Ventra App. These questions will explore some of the trip planning features that are being developed by the project. In conjunction with questions probing awareness, the survey will contain questions evaluating the degree to which seeing Divvy on the app was useful and potentially changed their behavior.

**Hypothesis 4:** Bike-sharing use by Ventra App users increases for egress trips from public transit.

**Performance Metric:** Use of Divvy by Ventra App users at the end of the transit trip

### **Data Sources:**

- **Survey of Ventra App users**

The survey will be implemented as described in Hypothesis 1. The Recent Trip Survey would potentially be used to address this hypothesis in addition to the broader retrospective survey.

- **Divvy bike share utilization data**

This is Divvy activity data. Divvy publishes its activity data online at <https://www.divvybikes.com/system-data>

The trip data is anonymized with the following structure:

- Trip start day and time
- Trip end day and time
- Trip start station
- Trip end station
- Rider type (Member, Single Ride, and Explore Pass)
- If a Member trip, it will also include Member's gender and year of birth

- **Ventra App travel data**

The Ventra App data is as described in Hypothesis 2.a.

- **CTA and Metra ridership data**

Ridership data comprises information on ridership of CTA and Metra bus and rail. This data would be requested as unlinked trips by route by hour (or by day if hour is not available). If possible for rail lines, origin and destination station pairs would be useful.

### **Data Collection Period:**

The data collection period for the survey and Ventra App data is defined as during the project performance and evaluation period. The Divvy data collection period is defined as from the start of the Divvy system. Ridership data is requested back to 2015.

**Analysis Procedure:**

This hypothesis would be evaluated using several of the data sources listed above. The recent trip survey would evaluate the mode shift that the recent use of Divvy enabled (if any) and if the trip connected to or from public transit. The Ventra App data could support this analysis by identifying trips that egress from public transit across the population. The Divvy activity data may be useful for corroborating activity connecting to or from public transit as reported by the survey data. The public transit data would corroborate transit activity as related to Divvy activity. The retrospective survey would evaluate whether users reported increasing their use of Divvy for egress trips from public transit. These data sources would be used together to evaluate this hypothesis.

**Hypothesis 5:** Bike-sharing use by Ventra App users increases for access trips to public transit.

**Performance Metric:** Use of Divvy by Ventra App users at the beginning of the transit trip

**Data Sources:**

- **Survey of Ventra App users**

The survey will be implemented as described in Hypothesis 1. The Recent Trip Survey would potentially be used to address this hypothesis in addition to the broader retrospective survey.

- **Divvy bike share utilization data**

This is Divvy activity data as described in Hypothesis 4.

- **Ventra App travel data**

This is Ventra App data as described in Hypothesis 2.a.

- **CTA and Metra ridership data**

This is transit ridership data as described in Hypothesis 4.

**Data Collection Period:**

The data collection period for the survey and Ventra App data is defined as during the project performance and evaluation period. The Divvy data is defined as from the start of the Divvy system. Ridership data is requested back to 2015.

**Analysis Procedure:**

The analysis of this hypothesis will be the same as Hypothesis 4, but with a focus on access trips.

**Hypothesis 6:** Ventra App users ride public transit more due to the bike-sharing trip planning and payment features of the Ventra App.

**Performance Metric:** Public transit ridership change by Ventra App users

#### **Data Sources:**

- **Survey of Ventra App users**

The survey will be implemented as described in Hypothesis 1. The Recent Trip Survey would potentially be used to address this hypothesis in addition to the broader retrospective survey.

- **Divvy bike share utilization data**

This is Divvy activity data as described in Hypothesis 4.

- **Ventra App travel data**

This is Ventra App data as described in Hypothesis 2.a.

- **CTA and Metra ridership data**

This is transit ridership data as described in Hypothesis 4.

#### **Data Collection Period:**

The data collection period for the survey and Ventra App data is defined as during the project performance and evaluation period. The Divvy data is defined as from the start of the Divvy system. Ridership data is requested back to 2015.

#### **Analysis Procedure:**

The surveys will be the primary instruments applied to evaluate this hypothesis. The surveys will contain attributional questions that assess the degree to which users changed their behavior to use public transit more as a result of the Ventra App innovations. The analysis will be supported by the ridership data, as well as available app activity data.

**Hypothesis 7:** The new Ventra App features raise the overall satisfaction and comfort of users with public transit in Chicago.

**Performance Metric:** Level of satisfaction with public transit by Ventra App users

#### **Data Sources:**

- **Survey of Ventra App users**

The survey will be implemented as described in Hypothesis 1.

#### **Data Collection Period:**

The data collection period of the survey is as described in Hypothesis 1.

#### **Analysis Procedure:**

The survey of Ventra App users will ask questions of users about their overall satisfaction and comfort with public transit in Chicago. The questions will evaluate whether the Ventra App improves their

general satisfaction and comfort with the public transit system. Several questions will be asked, and the responses will be given on an ordinal scale.

**Hypothesis 8:** Ventra App users report greater access to locations in Chicago and connectivity to public transit due to the new features of the app.

**Performance Metric:** Reported perception of change in access to locations in Chicago and connectivity to public transit by Ventra App users

**Data Sources:**

- **Survey of Ventra App users**

The survey will be implemented as described in Hypothesis 1.

**Data Collection Period:**

The data collection period of the survey is as described in Hypothesis 1.

**Analysis Procedure:**

This hypothesis will be addressed through questions in the survey that evaluate the change in access to locations in Chicago and connectivity to public transit that results from using the Ventra App integrations. Respondents will effectively be asked whether their perception of overall access has changed as a result of using the app. The distribution of responses will be used to evaluate the hypothesis.

**Hypothesis 9a:** Ventra App users who are low-income report greater access to locations in Chicago and connectivity to public transit due to the new features of the app.

**Performance Metric:** Reported perception of change in access to locations in Chicago and connectivity to public transit by low income App users

**Data Sources:**

- **Survey of Ventra App users**

The survey will be implemented as described in Hypothesis 1.

**Data Collection Period:**

The data collection period of the survey is as described in Hypothesis 1.

**Analysis Procedure:**

The analysis of this hypothesis will be very similar to Hypothesis 8. The survey will contain questions that evaluate the respondents' perception of access to locations in Chicago, and the perceived change in access that has occurred as a result of the Divvy integrations with the Ventra App. The

distribution of responses to questions probing attributional changes to access will be used to evaluate the hypothesis.

**Hypothesis 9b:** Ventra App users who are people with disabilities report greater access to locations in Chicago and connectivity to public transit due to the new features of the app.

**Performance Metric:** Reported perception of change in access to locations in Chicago and connectivity to public transit by App users who have disabilities

**Data Sources:**

- **Survey of Ventra App users**

The survey will be implemented as described in Hypothesis 1.

**Data Collection Period:**

The data collection period of the survey is as described in Hypothesis 1.

**Analysis Procedure:**

The analysis of this hypothesis will be very similar to Hypothesis 8 and 9a. The survey will contain questions that evaluate the respondents' perception of access to locations in Chicago, and the perceived change in access that has occurred as a result of the Divvy integrations with the Ventra App. The distribution of responses to questions probing attributional changes to access will be used to evaluate the hypothesis.

**Hypothesis 10:** The project produces a series of lessons learned that will be documented through expert interviews with project stakeholders.

**Performance Metric:** Qualitative documentation from stakeholder interviews

**Data Sources:**

- **Expert interviews, which will include the evaluation of operational components**

This data is qualitative in nature. The Project Team will identify members that can be available to interview with the IE team. The Project Team should specify a minimum of three people with enough knowledge on the project to talk candidly about its successes and challenges. The IE team will interview these candidates to understand the lessons learned from project implementation.

**Data Collection Period:**

The data collection for stakeholder interviews should occur at least six months after the launch of the demonstration, but it may be conducted later, as long as it is within a maximum of two months after the end of the demonstration period.

**Analysis Procedure:**

An expert interview protocol will be developed. The interviews will be conducted and synthesized from notes and recordings into a summary describing key insights from experts directly involved in the project. Table 5 lists potential interviewees.

**Table 5: Suggested Interviewee Name, Role/Affiliation, and Contact Info**

<b>Interviewee</b>	<b>Role/Affiliation</b>	<b>Contact Info</b>
Amanda Woodall	Program Director/CDOT	<a href="mailto:amanda.woodall2@cityofchicago.org">amanda.woodall2@cityofchicago.org</a>
Nick Smith	Senior Manager/CTA – Planning	<a href="mailto:nsmith2@transitchicago.org">nsmith2@transitchicago.org</a>
David Faust	Cubic Transportation	<a href="mailto:DAVID.FAUST@cubic.com">DAVID.FAUST@cubic.com</a>

# Appendix A. Selected Draft Survey Questions: *Retrospective Survey*

This section presents selected draft survey questions for those who use the Ventra App and the Divvy Bike share system. These survey questions are subject to revision, additions, and deletions. These questions provide examples of the types of questions that may be asked, subject matter to be covered, and serve as a starting point for final design. Wording may be adjusted to handle specific nuance or circumstances that are specific to the project. Additional questions may be added. The timing and the structure of the survey implementation may also change content, based on input from project partners. Branching and skip logic will be used, not everyone will see every question or every option. The questions below are designed within a retrospective context. Respondents are surveyed once, after the project has been running, to report on the impact that the project has had on their travel behavior. It is intended that questions will be supported by activity data provided by the Ventra App. The survey may require modification to present context specific questions within the Chicago and surrounding environment. Input on the survey questions content and design is continuously welcome from all project partners.

Finally, a proposed Recent Trip Survey design is also considered for this evaluation, and will be presented in Appendix B, following the draft Retrospective design.

1. Including yourself, how many people live in your current household?
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6
  - More than 6
  
2. What best describes your relation to the other people in your current household? (Please check all that apply)
  - Parent/Guardian(s)
  - Relatives (e.g., siblings, etc.)
  - Housemates/Roommates
  - Partner/Significant Other
  - Children (who are under your guardianship)

3. Please list the year, make, and model of your household's CURRENT vehicles, those that are owned or leased (e.g., 2014 Ford Fusion):

	Year	Make	Model
Vehicle 1			
Vehicle 2			
Vehicle 3			
Vehicle 4			
Vehicle 5			

4. In the last year, approximately how many miles have you driven on these vehicles? (not cumulative odometer reading)

(If the vehicle was owned for less than a year, please approximate your annual miles, based on how much you have driven it thus far.)

<Vehicle piped from above> <Miles driven drop down>

<Vehicle piped from above> <Miles driven drop down>

<Vehicle piped from above> <Miles driven drop down>

5. Which of the following modes of transportation have you used **within Chicago Region in the last two years?** (Please check all that apply.)

- Drive alone
- Drive/Ride with family/friend (non-commute)
- Walk (to a destination)
- CTA Bus
- Pace Bus
- Metra Rail
- Chicago L
- Amtrak
- Uber / Lyft or other ride-hail service
- UberPOOL / Lyft Line or other shared-ride service
- Taxi
- Bicycle
- Motorcycle or scooter
- Carpool (for commuting)
- Vanpool
- Car Rental within Chicago Region
- Other, please specify: \_\_\_\_\_

Note: This question is used to narrow down the modes used by the respondent. Only modes selected are presented in the following questions about changes in mode use. For all questions that carry forward, respondents are only asked questions about modes that they have used. Subsequent questions narrow this down further.

6. Please indicate about how frequently you CURRENTLY use the following modes.

	Not available to me or not in my area	Never in the last year	Less than once a month	Once a month	Every other week	1 to 3 days per week	4 to 6 days per week	Once a day	2 to 4 times a day	More than 4 times a day
<Mode that was selected in Q5>										
<Mode that was selected in Q5>										
<Mode that was selected in Q5>										
<...>										

Earlier this year, the Ventra App launched a new integration of features with Divvy, allowing you to plan trips with information about Divvy, and allowing you to pay for Divvy trips through the Ventra App.

7. Have you accessed any information about Divvy through the Ventra App?

- Definitely
- Probably
- Probably Not
- Definitely Not

8. When you need information about Divvy for trip planning, how often do you use the Ventra App?

- I never use Divvy at all
- All the time (every time I plan travel with Divvy, I use the Ventra App)
- Almost all the time
- Most of the time

- Sometimes
- Not too often
- Rarely
- Never (I never use the Ventra App when or before I travel with Divvy)

9. Have you paid for any Divvy trips through the Ventra App?

- Definitely
- Probably
- Probably Not
- Definitely Not

10. When you pay for Divvy, how often do you use the Ventra App?

- I never use Divvy at all
- All the time (every time I pay for Divvy, I use the Ventra App)
- Almost all the time
- Most of the time
- Sometimes
- Not too often
- Rarely
- Never (I never use the Ventra App when or before I travel with Divvy)

11. Has using the Ventra App with these integrations Divvy with changed your travel behavior?

- Definitely
- Probably
- Probably Not
- Definitely Not

12. Please indicate which modes have changed as a result the Ventra App along with Divvy information and payments, and which modes have been unaffected.

<i>Only modes selected above (used) shown. These are examples</i>	Yes, my use of this mode HAS CHANGED due to Ventra App and Divvy	No, my use of this mode has NOT CHANGED due to Ventra App and Divvy
Drive alone		
Drive/Ride with family/friend (non-commute)		
Walk (to a destination)		
CTA Bus		
Pace Bus		
<...>		

13. Overall, about how much more or less often have you used these modes because of the Ventra App and Divvy?

Overall, because of the Ventra App integrations with Divvy system, I travel by...

<i>Only modes selected above (Changed) are shown. These are examples.</i>	Much more often	More often	About the same	Less often	Much less often
Drive alone					
Drive/Ride with family/friend (non-commute)					
Walk (to a destination)					
CTA Bus					
Pace Bus					
<...>					



We would like to now talk about your most recent trip you made when you used Divvy with the Ventra App. This could have been the last time that you **planned a trip with the Ventra App** to use Divvy, or it could have been the last time that you **paid for a trip with the Ventra App** to use Divvy. Please consider whatever trip was most recent.

17. Thinking about the whole trip (not just when you used Ventra or Divvy), what was the approximate origin of this most recent trip?

Please indicate two streets that cross near this location, and the city

City:

Street #1:

Street #2:

18. What type of place was this?

- Home
- Work
- Social / Recreational
- Retail Location
- Medical Facility
- Other, please specify: \_\_\_\_\_

19. What was the approximate final destination of this trip (once you stopped traveling)?

Please indicate two streets that cross near this location, and the city.

City:

Street #1:

Street #2:

20. What type of place was this?

- Home
- Work
- Social / Recreational
- Other, please specify:

21. What was the purpose of this trip?

- Go to or from a restaurant/bar
- Social/recreational trips
- Commute to or from work
- Commute to or from school
- Go to or from public transit
- Go to or from work-related meetings during the day
- Go to or from grocery shopping
- Go to or from other shopping (non-groceries)
- Run non-shopping errands

- Go to or from healthcare services
- Go to or from gym
- Move bulky items
- Transport pets
- Other, please specify: \_\_\_\_\_

22. Did you use Divvy to connect TO or FROM a public transit system during this trip?

- No
- I connected TO Transit
- I connected FROM Transit

23. What transit system did you connect TO or FROM?

- CTA Bus
- Pace Bus
- Metra Rail
- Chicago L
- Amtrak
- Other, please specify: \_\_\_\_\_

24. Would you have used Divvy, if you did not have the Ventra App to access information or pay for Divvy?

- Yes
- No
- I do not know

25. If Divvy was not available, then which modes would you have used to make this trip? Please select all that apply.

- I would not have made the trip
- I would have driven all the way
- Got a ride from friend or family
- CTA Bus
- Pace Bus
- Metra Rail
- Chicago L
- Amtrak
- Uber / Lyft or other ride-hail service
- UberPOOL / Lyft Line or other shared-ride service
- Taxi
- Bicycle
- Walk
- Other, please specify:



32. Is being able to pay for Divvy with the Ventra App a useful feature to you?

- Yes, I currently use it
- Yes, I might use it someday
- No, I probably will never use it
- I don't know

33. Is being able to plan trips with Divvy using the Ventra App a useful feature to you?

- Yes, I currently use it
- Yes, I might use it someday
- No, I probably will never use it
- I don't know

34. Since using the Ventra App, my satisfaction with public transit in Chicago has..

- Greatly increased
- Increased
- Remained unchanged
- Decreased
- Greatly Decreased

35. Since using the Ventra App, my comfort with public transit in Chicago..

- Is much better than before
- Is better than before
- Is about the same
- Is worse than before
- Is much worse than before

36. Since using the Ventra App, my ability to access locations using public transit.

- Is much better than before
- Is better than before
- Is about the same
- Is worse than before
- Is much worse than before

37. What is your gender?

- Male
- Female
- Prefer not to answer

38. In what year were you born?

Drop-down <years>

39. Do you use a wheelchair?

- Yes
- No

40. Do you have other disabilities that require specialized accommodations for transportation?

- Yes
- No

41. Do you require transportation vehicles and infrastructure that is ADA compliant to get around?

- Yes
- No

42. What is the highest level of education you have completed?

- Less than high school
- Currently in high school
- High school/GED
- Currently in 2-year college
- 2-year college degree
- Currently in 4-year college
- 4-year college degree
- Currently in post-graduate degree
- Post-graduate degree (MA, MS, PhD, MD, JD, etc.)
- Prefer not to answer

43. What is your race or ethnicity? (Please check all that apply.)

- African American
- American Indian or Alaskan Native
- Asian
- Caucasian/White
- Hispanic or Latino
- Middle-Eastern
- Native Hawaiian or Pacific Islander
- South Asian (e.g., Indian, Pakistani, etc.)
- Southeast Asian
- Prefer not to answer
- Other, please specify: \_\_\_\_\_

44. What kind of housing do you currently live in?

- Detached single-family home
- Attached single-family home
- Building with more than 100 units
- Building with between 10 and 100 units
- Building/house with fewer than 10 units
- Mobile home/RV/Trailer
- Other, please specify: \_\_\_\_\_

45. Approximately what was your gross (pre-tax) household income in 2017?

- Less than \$10,000
- \$10,000 to \$14,999
- \$15,000 to \$24,999
- \$25,000 to \$34,999
- \$35,000 to \$49,999
- \$50,000 to \$74,999
- \$75,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 to \$199,999
- \$200,000 or more
- Prefer not to answer

46. Please indicate two streets that cross near your HOME location as well as the city.

City: \_\_\_\_\_  
Street #1: \_\_\_\_\_  
Street #2: \_\_\_\_\_

47. Please indicate two streets that cross near your WORK location as well as the city.

City: \_\_\_\_\_  
Street #1: \_\_\_\_\_  
Street #2: \_\_\_\_\_

48. This survey asked a lot of questions about your travel behavior with Divvy and the Ventra App in the Chicago region. Please feel free to elaborate here on how your travel behavior has been affected.

Your comments (if you provide any) will only be reviewed confidentially in support of your other responses. You will not be contacted about them. Anything you write may help support the impact analysis, or clarify responses you provided in the survey.

You can tell us about elements we might have missed through the survey questions or that you feel need additional clarification. This is completely optional, you can write as much as you would like or nothing at all. If you do choose to provide comments, please try to convey input that is

constructive, helpful, and kindly worded; what you write will be read. In either case, thank you again for taking this survey.

<Comment Box>

# Appendix B. Selected Draft Survey Questions: *Recent Trip Survey*

The implementation of a recent trip survey may benefit the evaluation. The recent trip survey is a simple survey that could ask up to four questions about the recent trip. It could ask about 1) Whether they would have still used Divvy had the Ventra App not contained Divvy information or payment capabilities, 2) the mode that would have been used in the absence of Divvy, 3) trip purpose, and 4) whether the trip connected to or from public transit. The recent trip survey is valuable because it gets high resolution mode shift, ideally tied to a specific trip. It is more technically challenging to implement, because it requires quick follow up after a recent trip (usually via email), and the survey operator must try to avoid over-surveying people if they take a lot of trips. The questions asked would appear roughly as follows:

1. If the Ventra App did not have information and payment capabilities, would you have used Divvy?
  - Yes
  - No
  
2. If Divvy was not available, then which modes would you have used to make this trip? Please select all that apply.
  - I would not have made the trip
  - I would have driven all the way
  - Got a ride from friend or family
  - CTA Bus
  - Pace Bus
  - Metra Rail
  - Chicago L
  - Amtrak
  - Uber / Lyft or other ride-hail service
  - UberPOOL / Lyft Line or other shared-ride service
  - Taxi
  - Bicycle
  - Walk
  - Other, please specify: \_\_\_\_\_
  
3. What was the purpose of this trip?
  - Go to or from a restaurant/bar
  - Social/recreational trips
  - Commute to or from work
  - Commute to or from school
  - Go to or from public transit

- Go to or from work-related meetings during the day
- Go to or from grocery shopping
- Go to or from other shopping (non-groceries)
- Run non-shopping errands
- Go to or from healthcare services
- Go to or from gym
- Move bulky items
- Transport pets
- Other, please specify: \_\_\_\_\_

4. Did you use Divvy to connect to or from public transit?

- Yes
- No

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