511 SF Bay Transit Data Manager (TDM) Website

Draft Concept of Operations

Version 1.0

May 12, 2015

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1. BACKGROUND, 511 SF BAY

511 SF Bay is the Metropolitan Transportation Commission's (MTC's) free phone, web, and mobile service that consolidates San Francisco Bay Area transportation information into a one-stop resource. 511 SF Bay provides free up-to-the-minute information on traffic conditions, incidents and driving times, transit trip planning and schedules, routes, fare, and real-time transit information for the Bay Area's public transportation services, a bicycling map and route planner, parking information, and a ridematch program. The program provides transportation information to the public by telephone via the federally dedicated 511 number, on the web at 511.org, on mobile at m.511.org, via text messaging, and through transit trip planner mobile applications for iOS and Android.

After twelve years in operation, 511 SF Bay is currently planning its Next Generation (NextGen) system. The drivers for NextGen planning include an ongoing need for traveler information in the Bay Area, a general rise in customer expectations around this information, rapid changes in technology and development in the commercial sector, increased private sector alternatives, and long-term funding forecasts.

2. SYSTEMS ENGINEERING PROCESS

The design, development, and implementation of the 511 SF Bay NextGen system will follow the systems engineering process shown in **Figure 1** below.

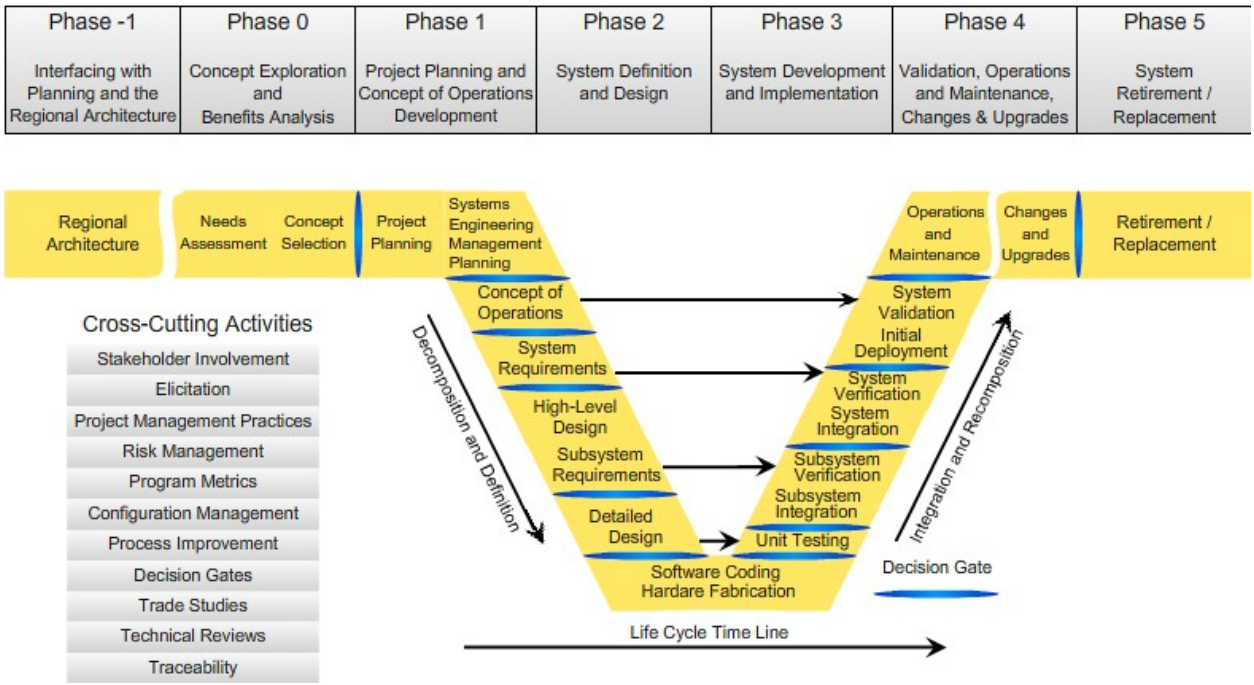


Figure 1- Systems Engineering Process

The 511 NextGen system is divided into multiple subsystems including:

- New 511 SF Bay NextGen Website
- Enhanced Interactive Voice Response (IVR) system

- System Integrator
- Google Multi-Modal Trip Planner
- Consolidated Operations Center

Each of the 511 NextGen subsystems has a different development schedule, however all of the pieces are interrelated. There will be one Systems Engineering Management Plan (SEMP) for the entire 511 NextGen system. Each subsystem will have its own Concept of Operations, Requirements Definition, and Design. At the appropriate time, a Coordinated Concept of Operations will be developed for the entire 511 SF Bay NextGen system.

This document represents the Concept of Operations for the Transit Data Manager (TDM) portal, which is part of the backend data collection, processing, and dissemination (System Integrator) subsystem. It is based on a foundation of Needs, Goals, and Objectives of the TDM, and includes high-level scope, roles and responsibilities, and operational scenarios.

3. PROJECT CONTEXT

Currently, there is an existing system that aggregates static transit data from various transit operator partners into the Regional Transit Database (RTD). The existing process requires manual processing of static data, including manual entry, from a variety of sources and mediums (XML, spreadsheets, websites, etc.). The process is labor intensive and has a high risk of human error.

The purpose of the Transit Data Manager (TDM) portal is to automate static data collection and processing into the RTD. The portal will allow transit operators to upload/enter static data directly into the RTD. Using the TDM, transit operators will be able to perform quality review of their data and take corrective actions, if necessary.

Currently, transit operators do not have access to the electronic Transit Information Display (eTID) configuration data. TDM will allow the transit operators to have access and maintenance privileges to the eTID configuration data that affects the eTID public display contents.

The purpose of the TDM is to automate processes that are currently manual and require significant coordination between MTC and transit operator staff. This will save time and resources, while increasing accuracy. The project will also allow more transparency to the transit operator partners, which will enable them to have more control over the process and the data that is exchanged with 511.

4. NEEDS, GOALS, AND OBJECTIVES

MTC has identified an ongoing need for highly accurate, reliable, and easily accessible traveler information in the Bay Area's complex transportation network, during commonplace as well as emergency situations.

This project's goals are to provide a web-based portal that enables transit operators to upload static data and automatically import the data into the RTD. It will also enable transit operators to have review and edit access to the configuration data of the eTIDs in their jurisdiction.

To achieve these goals, this project's objectives include the following:

- Automate static transit data import to the RTD to minimize manual effort
- Provide transit operators control over data within 511 through web portal
- Automate quality control process as much as possible, through data validation checks
- Provide access to eTID configuration data for review and editing
- Provide multiple levels of data review, editing, and approval access

5. HIGH LEVEL SCOPE

The 511 Transit Contractor will be responsible for the development and implementation of the TDM portal. The design of the portal interface will be done by the 511 Web Services Contractor. The 511 Transit Contractor (hereinafter referred as 'the Contractor') may also finalize this Concept of Operations, if modification during the design process becomes necessary.

The development of the TDM includes the design, development, testing, and deployment of a web-based portal that will be deployed to the existing 511 Amazon Web Services (AWS) Cloud.

Currently, static transit data is maintained in the existing RTD and the eTID configuration data is maintained in a separate eTID database. The eTID database will be merged with RTD and the new expanded RTD will become the NextGen RTD and be the basis for the TDM development. The TDM and the NextGen RTD will be operated and maintained by the Transit Contractor until the NextGen 511 Systems Integrator takes over operations.

6. PARTICIPANTS, ROLES, AND RESPONSIBILITIES

This project will rely upon collaboration between several key participants:

MTC initiated the project, will maintain overall ownership of the system, and will perform oversight, project management, and coordination of all activities from design through evaluation.

The 511 Web Services Contractor (Civic Resources Group - CRG) is responsible for the user interface design of the TDM portal. They will be defining the user interaction that will occur on the portal. The 511 Web Services Contractor will deliver the web page templates with necessary graphical components.

The 511 Transit Contractor (Leidos) will use the design template from the Web Service Contractor and provide development, testing, and implementation services. The Transit Contractor will be responsible for the launch of the system.

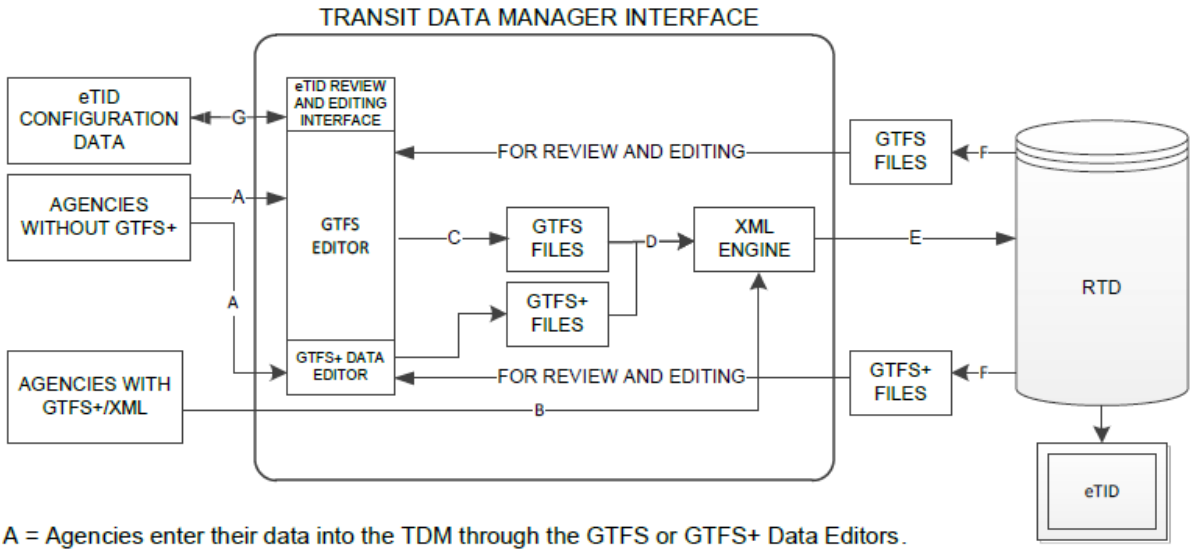
The new NextGen 511 System Integrator (SI) - will assume and maintain the TDM portal for MTC. This contracted party will be responsible for operation and maintenance of the entire application and will address all front-end, back-end, and database technical issues. The SI will not be responsible for the accuracy or the content of data, but must ensure that the data provided by the transit agencies are

maintained and disseminated without modification. As errors and issues are identified, the SI must coordinate with the transit agencies for resolution.

Transit Agencies will be the primary users of the application. Individual agencies will load, update, and maintain their respective data. The Agencies will be fully responsible for the content of their data provided and updated through the TDM.

7. OPERATIONAL CONCEPT

Data will flow to and from the TDM through various processes. **Figure 2** below shows the data flow starting from Agency, through the TDM, into the RTD, and lastly, to the eTID and other data consumers.



A = Agencies enter their data into the TDM through the GTFS or GTFS+ Data Editors.

B = Agency data that is already in GTFS format is uploaded directly to XML engine.

C = GTFS or GTFS+ Data Editors convert files into GTFS or GTFS+ files.

D = The GTFS or GTFS+ files are processed through the XML engine.

E = The XML Engine exports the data to the RTD.

F = The RTD provides agency data back to the GTFS or GTFS+ Data Editors in the TDM for review and editing.

G = Agency can configure a hub sign. Request can be made for a message to be placed on a regional hub sign.

Figure 2 Transit Data Manager Data Flow

8. OPERATIONAL SCENARIOS

Operational scenarios describe how the system operates from the perspective of multiple user types and in different conditions.

8.1 Transit Operator – Static Data – Initial Data Entry

A Transit Agency that is not yet part of the 511 program will need to manually send a request to MTC to join. Upon acceptance by MTC, a new agency and necessary account will be created in the RTD. Log-in credentials will be provided to the Agency that will enable access to the TDM. The Agency can then proceed to log-in and upload data for the first time, utilizing any approved format or manually enter data through the TDM interface.

A Transit Agency that is already part of the 511 program will already have an account set up in the RTD. The Agency's current data will be in the system and can log into the TDM at any point to access its data.

8.2 Transit Operator – Static Data – Subsequent Data Entry and Management

Transit Agencies will submit data for service changes as and when necessary. They will have the option to manually edit their data in the TDM or to load entirely new XML/GTFS+ data files. Data loaded/edited through TDM will be passed through the XML Engine in order to load into the RTD. Agencies will have the ability to download its data in either GTFS or a pre-defined XLSX format. When submitted, new data will override existing data. Partial GTFS+ loading will not be supported; the Agency will need to upload an entire GTFS+ dataset or manually make edits in the TDM. All data will be saved and hosted in the RTD.

8.3 Transit Operator –eTID Configuration Data

Transit Agencies will be capable of controlling their transit services displayed on eTIDs through the TDM web portal. The Agency can configure and setup each eTID its service information is displayed on. Each eTID owner will identify transit agencies that should be represented on it. All transit agencies represented on the eTID will then be able to configure the routes and stops to be included on it. All configuration will be saved in the RTD. There will be three levels of information displayed:

- Route Level – the Agency will be responsible for picking and choosing specific routes and stops to be displayed on the eTID. The Agency may also provide route level service alerts. MTC will have no control over route level information displayed on eTIDs.

- Agency Level – the Agency will be responsible for including service information affecting the entire agency or large segment of its service in the vicinity of the eTID location. MTC will have access to this information and may work with the Agency to make necessary changes.

- **Regional Level** – the Agency will be able to submit messages with regional impact; however, these message will need to be processed through MTC. MTC will receive these messages, make any edits deemed necessary, and may choose which eTIDs are most appropriate to display the information on. In addition, MTC may also post regional/sub-regional messages.

The TDM will facilitate the configuration of the information shown on the signs by associating selected/entered information to particular eTID and saving them in the RTD; however, the creation of web pages shown on eTIDs will not be part of the TDM application. There will be another eTID display application that reads configured data from the RTD, generates the web page, and responds to requests from eTIDs themselves. Development and evaluation of the eTID display application will be done under a separate project.

8.4 RTD

The RTD will continue to be the back-end database for the entire system. Minor changes to the RTD may be necessary during the development of the TDM; however, majority of the RTD will generally remain unchanged in form and function. The RTD will be migrated to the cloud and hosted on an open source database (PostgreSQL) as part of task order with the 511 Transit Contractor.

8.5 Log In Procedure

MTC and the SI will have the ability to create accounts for Transit Operators. Each Transit Operator will be given one Administrator account per agency. The Transit Operator Admin account will have the ability to create other accounts for that agency. The Transit Operator Admin account and subaccounts only have the ability to upload, overwrite, and edit information for that agency.

8.6 Reporting

All action that occurs within the TDM will be linked to a specific Transit Operator. The System Integrator will have the ability to run activity reports. The reports will be run on a quarterly basis at a minimum or when there is unusual activity.

The reports will show who has logged in, what changes were made, and when the changes occurred. The TDM system report shall flag data that has not been updated based on a time period configurable by the Admin user. The System Integrator will also get an email notification if there is old data, and they may then choose to prompt the appropriate operator representative to upload new data using the TDM. All reports can be queried by MTC and the System Integrator; individual agencies can request for activity reports as needed.

8.7 Archiving

Archiving protocols will be developed to ensure proper documentation keeping. The System Integrator will ensure that all data and activity reports are archived and will store them in appropriate locations. Frequency and other details of the archiving protocol will be decided on during the development phase.

8.8 Quality Control

Quality control for the data that is disseminated to the public will primarily be the responsibility of the individual Transit Agencies. The TDM will have some automated QC capabilities such as detection of duplicate trips, redundant stops listed for one specific trip, and data validation checks. If comments are received about data quality, they will be checked against data from the RTD. All data issues will be logged and provided to the specific Agency. The Agency will then be responsible for fixing and updating the data in the TDM. MTC and the System Integrator will have very little part in ensuring the accuracy and quality of the data inputted by an Agency; it will be the Agency's responsibility to ensure the quality of its information. Manual QC efforts by MTC and the System Integrator will be minimized.

8.9 TDM Failure Scenario

Availability of the TDM website will be the responsibility of 511 System Integrator Contractor. Because the system will be in a cloud, the availability and reliability of the web portal will be enhanced and governed by MTC's agreement with the cloud vendor. MTC's NextGen 511 System Integrator will be responsible for any addressing "bugs" or failures within the system, ensuring proper up-keeping so that Agencies can have a reliable web portal in which to upload data into.

8.10 Preventive and Responsive Maintenance

The System Integrator will be responsible for the operation and maintenance of the TDM under the scope of their contract. A commercial off the shelf software will be used to track minor problems, issues, or bugs with the website. The software will list all of the identified issues with a log number, date of addition, and status of the closeout. The issues/bug list will be accessible by both MTC and System Integrator staff. Bugs can be added to the list by either MTC or new NextGen 511 System Integrator staff. The Contractor will be responsible for adding issues to the list that are reported by the website users or data partners. The issues/bugs should be able to be prioritized and sorted. Any high priority issues should be resolved within a set number of days of first being reported.

8.11 Transition Plan

Transitions between key participants and their responsibilities are as follows:

Existing 511 Transit Contractor → new NextGen 511 System Integrator

Once the TDM is developed and brought to the production stage, the new NextGen 511 System Integrator will be responsible for the overall TDM system which includes general 511 maintenance. MTC will work with the development contractor to ensure production deployment of the TDM portal as per requirement and design and will work with both development contractor and the 511 System Integrator to ensure a seamless transition from deployment to operation & maintenance mode.