Study for a Centralized Application for Taxis in Montréal

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WINDELS MARX | Windels Marx Lane & Mittendorf, LLP

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This report was prepared pursuant to a consulting engagement by and between the City of Montreal Taxi Bureau and the law firm of Windels Marx Lane & Mittendorf, LLP, following a competitive procurement process. All services delivered by the lead supervisor of this project at Windels Marx, Partner & Transportation Practice Chair Matthew W. Daus, were provided completely on a pro bono and volunteer basis, including all services provided in Canada and all related expenses. The project team included the following Windels Marx staff: Matthew Daus, Sharon Klein, Salma Mallah, Andrew Matera, Jason Mischel, and Brook Taye. Special thanks go to regulatory staff at the Montreal Taxi Bureau who collaborated on this project, including Sylvain Tousignant and Kim Thibault, as well as to the Montreal Taxi Bureau's Innovation Committee, who provided indispensable comment. Also, the cooperation of the various government agencies referenced in this report was indispensable, as every jurisdiction promptly provided public information which was relied on in terms of portraying the approach, facts and recommendations communicated in this report (of course, the opinions expressed here are purely of the authors, and not of staff or in any official capacity from the transportation regulation agencies surveyed).

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Brook Taye is an economist responsible for conducting market studies that focus on the current legal and economic settings of the various for-hire industries in the US and around the world for the purpose of advising clients on taxicab medallion valuation factors, changes in the regulatory environments that could affect taxi medallion finance, the introduction of new technologies to the for-hire industry and their impact on current market participants, and to update clients on all new data and information collected and analyzed as part of the various market studies. His research area also covers general and regulatory matters, including for-hire ground transportation logistics, planning, licensing, enforcement, technology implementation, operational issues and regulatory reform to assist in both the preparation, and aftermath, of major changes in various regulatory environments.

Executive Summary

The City of Montreal is seeking to establish a program by which it will require its fleet of licensed taxicabs and Transportation Network Companies ("TNC(s)") to accept dispatches through internet-enabled applications and allow passengers to electronically "hail" City of Montreal licensed taxicabs. The purpose of a Call for Tender ("CFT") in Montreal would be to qualify one or more such electronic hailing applications ("E-Hail App" or "App" or "Application") that best meet the needs and requirements of the City. The top priorities for the universal app are that riders must find it easy enough to use and that the privacy of riders who use it is protected. The goals and objectives would be to enable and require traditional taxicab companies and independent taxi drivers in the City of Montreal to jointly use an efficient centralized (or "universal") electronic dispatch system adapted to their operations in order to maintain high revenues for taxi drivers.

The focus of the application will be on the following:

- Superior hi-tech functionality and service;
- Ability to handle on-demand or prearranged trip requests;
- Pick-up location input options (i.e. physical address, landmark, utilization of GPS from a customer's phone);
- Ability to request specific vehicles, such as accessible taxis;
- Commitment to passenger safety, convenience and satisfaction, including thorough ability for customers to provide additional specific instructions and notes to drivers, and to display options such as driver's name/driver's picture/vehicle number/vehicle location at time of request/route to pick-up location;
- Provision of custom "Profile" section for each customer, including contact information;
- Provision of "Support" option for customers to submit compliments or complaints;
- Passenger/driver communications options, including ability for passengers to send text messages to driver and provision of anonymous call system;
- Provision of e-payment complying with industry data security standards; and
- Provision of Driver Facing Dispatch Technology application that includes:

a. Alerting drivers of trip requests, providing essential details of trip requested (i.e. pick-up location and time);
b. Presenting driver with turn-by-turn suggested and alternate routes, and providing a driver with the ability to send messages to a dispatch center;
c. Establishing a "Driver Profile" containing trip log and customer rating information;
d. Ability to send an automatic message to the dispatcher when equipment is not working properly;
e. Ability to receive customer notes and details, and provision of mobile device manager to secure and monitor usage of the application technology.

This study discusses several approach options for consideration based upon a review of other jurisdictions and the current Montreal regulatory system and taxi market. The options include: Multiple Government Sanctioned Applications; Single Government Branded Application; Single Government Branded Application with Competing Applications (no platform); Open Shared Platform (with or without a Government Branded Application); Government Regulatory Dashboard with Competing Applications; and Private Sector Solutions.

After a comprehensive review of the different approaches undertaken by the various jurisdictions, including San Francisco, Chicago, Los Angeles, Montgomery, New York, Tampa, and Washington, D.C., this study also presents our recommendation for the best regulatory approach for the City of Montreal to implement in order to create a universal taxi application. It is our recommendation that the best approach for the City of Montreal is to adopt an open shared platform with a government application (allowing competitive commercial applications to operate in the City as well).

Any recommendations in this report, as well as any portrayal of the various approaches, are agnostic as to the particular solutions chosen in each other jurisdiction to date. While the recommended course of action for Montreal is based upon the combination of a number of various ideas explored or methods employed so far by other regulators, no approach is *per se* a universal best practice. Each jurisdiction has its own unique characteristics, evolutionary stage in terms of technology and various political, socio-economic, legal and other dynamics that do not call for a "one-size-fits-all" approach to the regulation or implementation of a "universal taxi application" solution. The various regulatory agencies and private entities that have and are

engaging in cutting-edge regulatory innovation, and the exploring new ideas, should be encouraged, tracked and monitored. It is too early to identify best or accepted regulatory practices, as universal taxi apps are still in their nascent stage. The approach chosen for Montreal does not, in any way, support or favor any other jurisdictions, or result in any tacit or overt opinion that the approaches of other cities are not appropriate. Montreal is benefitting from its own exchange of ideas, regulatory actions and leadership, as well as those of other regulatory agencies identified in this report.

The charts below set forth brief descriptions of each approach, the pros and cons of each option, as well as the regulatory costs, and jurisdictions in which regulators have attempted to implement (either partially, or completely) a universal taxi application.

Multiple Government Sanctioned Applications	
Description	• One or more government approved apps. • All taxis are required to use one of the government sanctioned apps. • Apps are privately owned and managed.
Jurisdiction	• Chicago
Pros	• Private sector carries financial and innovation burden. • Government sets approved framework and retains oversight privileges.
Cons	• No cross-dispatch capability. • Drivers only mandated to be on one of the apps results in none of the apps having full access to all of the taxis, meaning less drivers per app.
Implementation Method	• Licensing. • Request for Proposal ("RFP").
Costs	• ***Low to moderate costs (***$0 up to $500,000), government only approves the apps. • Costs of developing, maintaining and marketing the app falls on the app company.
Estimated Implementation Time	• Three months to one year.

Single Government Branded Application	
Description	• One e-hail application. • All taxi drivers are required to download the government branded application as its official local taxi app.
Jurisdiction	• Not applicable.
Pros	• Real-time information can be gathered, shared, and analyzed, which will drive industry innovation and can be used to assess demand; implement real time enforcement; and investigate customer complaints from a regulatory dashboard. • More government control over the direction of industry changes and related future technology advancements. • Taxis can compete as a whole industry against TNCs.
Cons	• Struggle for government to compete with constant updates made to private company applications. • Consumers have access to only one app. • The app may be very costly and require constant monitoring, updating, and the drafting and amending of new regulations.
Implementation Method	• Contract to develop application. • Approve rules and regulations to implement and enforce app use.
Costs	• Overall, the costs involved should be ***moderate (***$100,000 up to $500,000***).***
Estimated Implementation Time	• Implementation of this approach in its entirety could be completed in approximately ***one*** to ***two*** years.

Single Government Branded Application (with Competing Applications)	
Description	• Allows the government to select one single e-hail application. • Allows private companies to develop competing applications, with which taxi drivers may affiliate. • Although drivers are allowed to use competing apps, they are required by law to use the government app at all times while on duty.
Jurisdiction	• Washington, D.C.
Pros	• Real-time information can be gathered, shared, and analyzed; can be used to assess demand and implement real time enforcement. • More government involvement provides more control over the direction of industry changes and related future technology advancements.
Cons	• Commercial Apps are not required to share data or cross-dispatch, which means drivers only pick-up customers who have downloaded their affiliated app(s), and customers will only have access to taxis affiliated with the app(s) they chose to download. • Fracturing the taxi industry among different e-hail app providers limits the industry's ability to compete as a whole against TNCs.
Implementation Method	• Contract to develop application. • Approve rules and regulations to implement and enforce and approve rules and regulations governing its use.
Costs	• Overall, the costs involved should be ***moderate (***$100,000 up to $500,000).
Estimated Implementation Time	• Implementation of this approach in its entirety could be completed in approximately ***one*** to ***two*** years.

Open Shared Platform (with or without Government Application)	
Description	• Allows the local government to approve multiple private sector taxi apps as long as they each provide an open data feed so that all apps are able to communicate on an open platform to locate and dispatch all licensed taxis, regardless of which taxi company a particular vehicle is affiliated with, or which app the driver or customer used. • The local government also has an option under this approach to develop its own branded app, or brand an existing app as the official local taxi app, which is able to communicate on the open platform.
Jurisdiction	• Montgomery County, Maryland.
Pros	• Apps will be required to share data and cross-dispatch the nearest available taxi. • Taxis can compete as a whole industry against TNCs. • Competition among apps could drive industry advances. • Private development and competition lowers costs to local government. • Allows for new innovations to easily enter marketplace.
Cons	• Uncertainty as to how the universal protocol will develop. • Less government involvement means less control over the direction of industry changes and related future technology advancements.
Implementation Method	• Promote a commercial solution and approve rules and regulations governing its use. • Contract to develop platform technology and approve rules and regulations to implement and enforce.
Costs	• Overall, the costs involved should be ***low to moderate (***$0 up to $500,000***),*** and result in expenses less than or equal to the approaches involving government procurement.
Estimated Implementation Time	• Implementation of this approach in its entirety could be completed in approximately ***one*** to ***two*** years.

Government Regulatory Dashboard (with Competing Applications)	
Description	• Implements a government platform that is required to connect to various approved taxi e-hail apps. • Uses the government branded platform to ensure that every taxi has integrated with e-hail capable technology. • All approved apps must integrate with the platform. • No approved app is required to be able to e-hail taxis affiliated exclusively with other apps. (No cross-dispatching required)
Jurisdiction	• San Francisco, California.
Pros	• The platform will allow real-time information to be easily gathered, shared, and analyzed, leading to industry innovations. • Real-time data from every licensed taxi can also be used to assess the demand for taxicabs; implement real time enforcement; and investigate customer complaints from a regulator dashboard. • Ensures all taxis are e-hail capable and drivers and dispatch companies have the flexibility to associate with more than one integrated app.
Cons	• Cross-dispatching not required. • App companies will compete with one another to affiliate with taxis. • Fracturing the taxi industry among different e-hail app providers limits the industry's ability to compete as a whole against TNCs.
Implementation Method	• A procurement process to contract with a platform technology provider. • Will likely need regulations mandating the use of an approved app. • May also want to consider implementing regulations that set criteria and performance standards for taxi apps seeking approval.
Costs	• In comparison to other approaches, the cost to implement a government branded platform and regulate competing apps is ***moderate*** ($100,000 up to $500,000).
Estimated Implementation Time	• A regulatory dashboard with competing apps approach could reasonably be implemented in a period of ***one*** to ***three*** years.

Private Sector Solutions	
Description	• Allowing the private sector to create solutions with incentives. • Possible solutions include: o One app (industry is small, or collaborates); o One multi-city app network (IRU Global Taxi Network); o Aggregator service (multiple for-hire ground transport sub-modes, including taxis, for location and cost comparison) (e.g., Karhoo).
Jurisdiction	• Vancouver, British Columbia.
Pros	• Limited government burden. • Leaves the most room for innovation.
Cons	• Least government oversight and control. • Does not guarantee the solution will actually be implemented.
Implementation Method	• Incentives.
Costs	• ***Low cost*** (up to $100,000) to government depending on the type of incentive.
Estimated Implementation Time	• Not Applicable or unknown.

<u>Recommendation for Montreal:</u> Single Government Branded Universal Application With Open Data Platform	
Description	• All taxicabs mandated to accept Universal app e-hails while on duty. • Other privately developed apps allowed, but not licensed. • No licensing requirement for competing apps. • Only ONE Universal app developed and managed through an RFP, branded for the city of Montreal. • Cost for maintenance and management of the Universal app covered through new revenue streams (RFP response should include revenue generation strategy). • Rulemaking required to enforce app usage, including back-end dispatch system and meter integration and/or independent apps sharing APIs. • Open platform for data usage by government & private sector. • Fast implementation timeline and low costs should be included in RFP response (weighted and scored).
Pros	• Single app – keeping it simple…. • Limited ongoing financial burden. • Leaves room for innovation. • New revenue stream for regulator. • Full access to trip data. • Relieves government from ongoing technical and management oversight. • Provides coordinated solution for independent taxi drivers.
Cons	• Initial financial investment required of agency staff administration and consulting expenses.
Implementation Method	• Call for Tenders.
Costs	• ***Low cost*** (up to $100,000) • Initial administrative costs fully covered by the city. • Management and maintenance costs covered by new revenue streams (as proposed by a Call for Tender response of a winning vendor).
Estimated Implementation Time	• One to two years.

I. BACKGROUND ON MONTREAL TAXICAB INDUSTRY

Montreal is a city in the Canadian province of Quebec. It is the largest city in the province, the second-largest in Canada and the 8th-largest in North America. The city is on the Island of Montreal. In 2013 the city had a population of over 1.7 million, an increase of 4.1% over the previous year. The Greater Montreal metropolitan area (1,644 sq. mi) has a population of approximately 4 million, and a population of 1.8 million in the urban agglomeration, all of the municipalities on the Island of Montreal included. Montreal has the second-largest economy of Canadian cities. Today, the city is an important center of commerce, finance, industry, technology, culture, and world affairs.[1]

The Taxi Bureau of Montreal ("BTM") was established in 1986 as a result of the Quebec government's plan to decentralize taxi regulations and the management of the taxi industry. On November 30, 1987, BTM was officially opened with a mandate to work directly with the industry and the various stakeholders to develop and implement regulations that reflect the numerous concerns of the industry. In 2003, BTM extended its jurisdiction and now oversees towing operations in the City of Montreal.[2] Today, BTM manages a taxi industry that is estimated to be worth $950 million.[3]

As part of the decentralization strategy of the taxi regulation that was concentrated in the Quebec government and to reduce the glut of taxi licenses in Montreal, a plan to buyback taxi licenses was launched in Montreal in 1985 which lasted for five (5) years. The primary objective of the buyback plan was to reduce the number of licenses in the City of Montreal with the aim of improving the effectiveness and profitability of the taxi industry without diminishing the quality of service. The buyback plan lasted five and a half years, from June 1985 to November 1990. The operation led to the elimination of 1,287 licenses, a 25% decrease in the 5,222 taxi licenses formerly in service. The total cost of purchasing these licenses amounted to some $21 million, and was paid for entirely by taxi license holders; in exchange, the profitability of their licenses

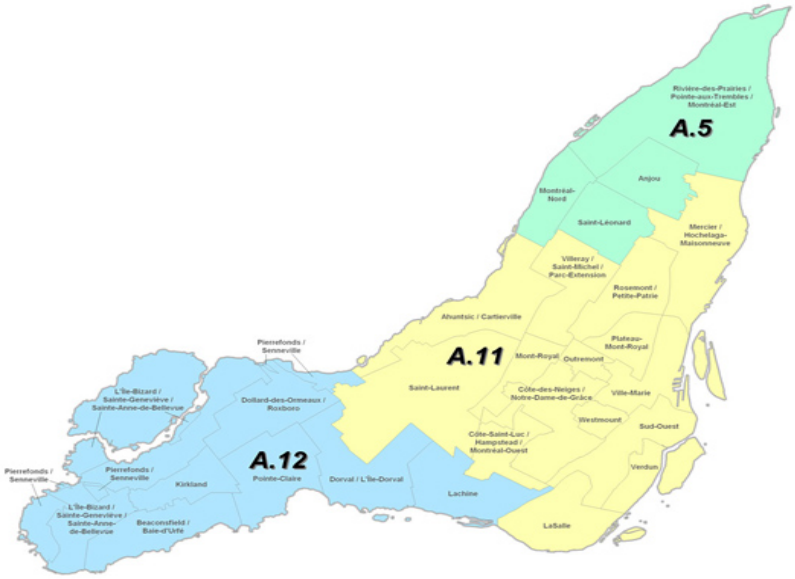
1 http://www.encyclopedia.com/topic/Montreal.aspx
2 http://ville.montreal.qc.ca/portal/page?_pageid=8177,92111595&_dad=portal&_schema=PORTAL
3 http://ville.montreal.qc.ca/pls/portal/docs/page/bur_taxi_fr/media/documents/Planification_triennale_BTR_2011-2013_FINAL_11-10-10.pdf

increased, along with its market value, which stood at approximately $55,000 in 1995, a few years after the conclusions of the buyback plan. Currently, there are 4,854 taxi licenses in Montreal divided into three (3) service areas including approximately 500 new permits added since November 2000 which are valid for a maximum of five years and cannot be transferred. The Quebec Department of Transportation supported and coordinated implementation of the buyback operation.

Montreal Taxi Permits

Montreal taxi Permits are issued corresponding to the different service areas that are demarcated by BTM. For the purpose of issuing taxi permits, there are three (3) service areas (A5, A11, and A12) that allow permit holders to provide point to point taxi service. Each service area has a specific number of permits issued that reflects the taxi demand. Currently, service area A5, A11, and A12 are served with 320, 3,860, and 265 permits respectively.[4]

Montreal Taxi Permit Service Areas

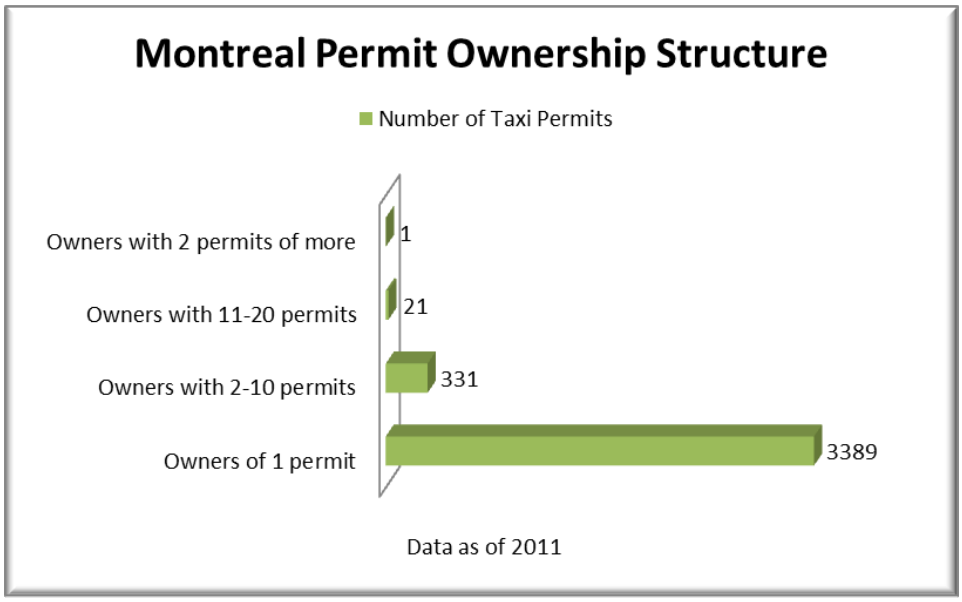


4 http://ville.montreal.qc.ca/pls/portal/docs/page/bur_taxi_fr/media/documents/Planification_triennale_BTR_2011-2013_FINAL_11-10-10.pdf

Before issuing taxi permits for a particular service area, BTM takes into consideration, where applicable, variables that will foster a healthy balance, in each service area, between the demands for taxi services and the profitability of enterprises holding taxi owner's permits. BTM could also attach conditions before issuing taxi permits to a specific service area. These conditions may limit the periods of service, the categories of clientele or any other aspect of operation that it deemed necessary.

Taxi Industry Structure and Stakeholders

As discussed above, there are approximately 4,854 taxi licenses in Montreal. The majority of these taxi permits are owned by individual owners.



According to the data from BTM, there are over 10,000 taxicab drivers in Montreal. Most of these drivers (3,650) are associated with the various call centers that facilitate dispatch. Approximately 795 permit holders work independently and are not associated with any call centers. Also, more than 420 taxi stands throughout Montreal enable passengers to obtain easy access to taxicabs.

Customer Service

Passenger satisfaction with the taxi service in Montreal has an obvious impact on ridership, and thus the overall health of the industry. For visitors to the city, taxicab availability and quality of service leave the first and last impressions, and thus impact the tourism industry. This intangible perception cannot be quantified and mostly affects the general reputation of a taxi system and its host city. Customer service is a minimal variable affecting taxi permits values, unless, of course, conditions become so poor that ridership is then impacted. When it comes to customer service for passengers, there are three main areas of focus: (i) the vehicle, (ii) payment systems, and (iii) driver standards.

(i) Vehicle Standard

The quality of the vehicle that is used to provide taxi transportation has a major impact on the quality of services offered. In 2002, the median age of new vehicles put into service for the first time in the taxi industry was nine (9) years old. In 2003, the introduction of measures and regulations, limiting the age of vehicles has reduced the median age to seven (7) years. Today, the median is five (5) years, and does not exceed ten (10) years.[5] Furthermore, as discussed below, the new taxi policy that is being developed by the Mayor attempts to introduce new vehicles that are environmental friendly and newer versions.

(ii) Payment systems

In terms of payment, the ease of payment and multiple payment options – including credit and debit card, as well as the ease by which passengers can use technology such as touch screens to understand the fare charged and more easily calculate tips - all have had a positive impact in improving the experience of taxi ridership. In Montreal, all taxicabs are not mandated to install credit card processing units. As a result, the level of service measured by the ease and convenience to pay with a debit and a credit card is affected. The Mayor's new plan, discussed

5 http://ville.montreal.qc.ca/pls/portal/docs/page/bur_taxi_fr/media/documents/Planification_triennale_BTR_2011-2013_FINAL_11-10-10.pdf

below, also attempts to address this issue with legislation that will mandate all taxicabs to be installed with credit card processing units.

(iii) Driver Standards

Prospective taxicab drivers are required to undergo various licensing tests and examinations before being able to obtain a taxicab driver's license. Prospective drivers are required, among other things, to hold a valid driver's license, undergo a health examination, and take courses on driving a taxi.

New Taxi Regulation – Proposal

In 2014, Montreal Mayor, Denis Coderre, announced a plan to modernize the taxi fleet (the "Plan") in the city by introducing security cameras, credit card processing machines, and a standardized color scheme. According to Mayor Coderre, the Plan, which was presented to the Montreal city council on August 18, 2014, aims to heighten security measures for taxi drivers and their clients as well as modernize the city's fleet of taxis. Mayor Coderre said the mandatory presence of cameras, and drivers holding less cash as a result of an anticipated increased credit and debit card usage, could deter taxi users from committing crimes (specifically, robberies). Security issues are planned to be dealt with first and everything else will follow. The new regulations would also call for GPS systems to be installed in every taxi, allowing companies to keep track of their cars on the job.

According to Mayor Coderre, different financing arrangements are being looked at to offset the costs related to the purchase and installment of new equipment. The city said several types of self-financing from within the industry will be a must, such as advertisements and promotions playing-off of screens inside the cabs generating substantial revenue to operators.[6] The proposed regulations will also look to make taxis more accessible to elders, the disabled and tourists. According to Mayor Coderre, the Plan will push for more environmentally friendly cabs, as it would encourage new taxi drivers to consider buying hybrid or electric cars once the city has more charging stations.

6 http://www.montrealgazette.com/Montreal+tables+policy+city+taxi+industry/10118815/story.html

Further details of the Plan were released in August, 2015. A blueprint aimed at making cabs safer for drivers and passengers includes provisions for electronic payments in all taxis, the installation of cameras and a "signature or distinctive image" for all vehicles. Tenders for the cameras will be launched this fall and the mayor expects installations to be completed by the end of 2016. Along with GPS, the Plan also calls for all taxis to be equipped with panic buttons. The Mayor plans for the modernization of the industry to be finished for the city's 375th anniversary, in 2017.

In September, 2015, the Board of Directors of the BTM established the Technological Innovation Committee (the "Committee) to discuss the technical issues related to the projects and technologies furthering the Plan. Moreover, the Committee is charged with the mandate to make recommendations to the BTM Board of Directors based on the deliverables identified in the Plan, adopted by the City of Montreal in August 14, 2014.

The Entrance of TNCs

Uber launched in Montreal in October of 2014.[7] According to the company, approximately 300,000 Uber requests are made via smartphone in Montreal each month.[8] A ride is ordered on the Uber platform in Montreal once every nine seconds.[9] Sixty-eight percent of UberX rides in Montreal are one-way[10], and twenty eight percent of UberX rides in Montreal start or end near a Metro station – usually between the user's home and a station.[11] Fifty percent of Uber's driver-partners work fewer than 10 hours a week and 70% work fewer than twenty hours a week.[12] Uber says the average hourly income earned by UberX driver-partners in Montreal is $22.40.[13]

7 http://www.cbc.ca/news/canada/montreal/montreal-uberx-crackdown-1.3307144.
8 http://www.cbc.ca/news/canada/montreal/montreal-uberx-crackdown-1.3307144.
9 http://montrealgazette.com/news/local-news/uber-says-it-offers-a-ride-every-nine-seconds-in-montreal.
10 http://www.cbc.ca/news/canada/montreal/montreal-uberx-crackdown-1.3307144.
11 *Id.*
12 *Id.*
13 *Id.*

Since its introduction, the mobile app has been met with staunch criticism. Mayor Coderre and both the Montreal and Quebec government have called the UberX service illegal.[14] Nonetheless, Uber continues to operate and taxi drivers in the city have held protests against UberX, arguing it has an unfair advantage and is compromising their ability to make a living.[15] Montreal's taxi bureau has been ramping up its efforts to crack down on the popular ride-sharing service and, as a result, more than 400 vehicles have been seized in Montreal in 2015, with 100 UberX cars seized in October 2015 alone.[16] Revenu Quebec also raided the City's Uber offices in May, 2015, in search of evidence that Uber is violating the provincial tax code.[17]

In December 2014, Uber Montreal executives met with the Quebec Transport Ministry, requesting that their company be legally recognized in the province.[18] Regulations, however, are still not in place. Jean-Nicolas Guillemette, Uber's general manager for Quebec, said the company hopes to work alongside the taxi industry, but he does not think his drivers should need to pay for taxi licenses because Uber is a different product.[19] He said he would like to work within a legal framework and is happy to sit down with Transport Minister Robert Poëti again to make that happen.[20]

14 *Id*.
15 *Id.*
16 *Id.*
17 http://news.nationalpost.com/news/canada/summer-of-uber-everything-you-need-to-know-about-the-upstart-ride-sharing-service.
18 http://www.cbc.ca/news/canada/montreal/uber-montreal-requests-to-be-regulated-in-quebec-1.2875639.
19 http://montrealgazette.com/news/local-news/uber-says-it-offers-a-ride-every-nine-seconds-in-montreal.
20 *Id*.

II. A UNIVERSAL APPLICATION

The advent of competition and new technologies has encouraged a continued effort by regulators around the globe to keep up with the latest transportation trends. That includes developing a new mobile application for all taxis that would have many of the same features as TNCs. These companies' easy-to-use apps, and sometimes lower fares, are tempting riders away from conventional taxis. A universal taxicab app could carve out a retail niche where taxicabs could serve the underserved and a certain portion of the market, with TNCs and surge pricing dominating peak hours and high-end customers, and lead to a possible refocusing of taxicabs to serve underserved areas. This new tool could let the local taxi industry catch up to the user-responsiveness of increasingly popular taxi alternatives like TNCs.

For purposes of this report, the following definitions apply:

- Application Program Interface ("API"): a set of routines, protocols, and tools for building software applications. The API specifies how software components should interact and APIs are used when programming graphical user interface (GUI) components.[21]
- Cross-dispatch: The ability for a smartphone application of a for-hire ground transportation service, or other dispatch system, to arrange for a dispatch of a vehicle to a requesting passenger, from a non-affiliated for-hire ground transportation business or smartphone application, accomplished through some method of integration (either direct or through a platform).
- Platform: A platform is a group of technologies that are used as a base upon which other applications, processes or technologies are developed. New standards-based interfaces and open interfaces allow application programs to run on multiple platforms. Additionally, software developers have developed software tools that allow applications to run on multiple platforms. This has given rise to the terms cross-platform software and multi-platform software.[22]

21 http://www.webopedia.com/TERM/A/API.html
22 https://www.techopedia.com/definition/3411/platform

- Regulatory Dashboard: A platform (as defined above), used for regulatory enforcement, which collects real-time data, with which regulators can: assess the supply and demand for taxicabs; monitor and facilitate dispatch of vehicles to meet consumer demand; implement real time enforcement to alleviate geographic or other discrimination in taxicab supply; enforce taxicab operating parameters, including fare calculation if desired, in real time; enforce taxicab driver licensing, vehicle operating authorization, and other driver rules.
- Universal Application: A smartphone or mobile device, whereby customers would have access to, and the ability to electronically hail, the entire fleet of taxis available in a particular jurisdiction.

The definition of a "universal taxi app" is an evolving concept, and it is not yet capable of a precise 'term-of-art' definition. However, for purposes of this report, reference to a "universal app" could be: 'a public and/or private sector technology solution to allow for multiple or all taxicabs (and possibly other for-hire vehicle sub-modes or services), to be placed on one or more smartphone applications (for one or more government branded or private apps), to consolidate dispatch functions to allow for more efficient delivery of the nearest taxicab or for-hire vehicle to consumers, with the goal of encouraging competition, consumer choice, safety and to allow for the collection, use and analysis of data, development of open data and cross-dispatching integrated platforms, and credit or debit card processing, with the overriding goal of leveling the playing field as an alternative to transportation network company market dominance.' This definition is based upon an all-encompassing review of various regulatory approaches, and its language will evolve over time as various projects reach fruition and are further analyzed as to their levels of success.

Recently, several leading U.S. cities have worked towards developing their own universal e-hailing apps, which will allow users to summon a taxicab from their smartphones: San Francisco, Chicago, Los Angeles, Montgomery, New York, Tampa, and Washington, D.C. This report summarizes the regulatory measures used in these cities to create universal or centralized e-hail taxi applications.

The success of any transportation service is ultimately dependent on how quickly, safely, cheaply, and reliably a customer can get to the destination in relation to other services or

transportation modes. For TNCs and taxis, speed and reliability is dependent on the density of cars on the road. A service with 1,000 cars available in a certain area will respond to a dispatch request faster on average than a service with 500 cars. Ultimately, the goal of the universal app is to require traditional taxicab companies, as well as TNCs, in the City of Montreal to jointly use an efficient centralized (or "universal") electronic dispatch system adapted to their operations in order to maintain high revenues for taxi drivers.[23]

23 http://www.cbc.ca/news/canada/montreal/uber-pushes-canadian-cities-to-re-evaluate-taxi-industry-1.3159212.

III. UNIVERSAL APP EXPERIMENTS - OTHER JURISDICTIONS

A. San Francisco, California

California is not only the birthplace of TNCs, but it has also served as somewhat of an incubator for technology companies providing transportation services.[24] In December of 2012, in an effort to address the many safety and regulatory concerns arising from the business operations of Lyft, SideCar, Uber, and other similar app companies, the California Public Utilities Commission (the "CPUC") issued an order to initiate a "quasi-legislative" rulemaking proceeding to consider amending existing regulations and/or promulgating new regulations which relate to passenger carriers, ridesharing, and what the CPUC termed "new online-enabled transportation services."[25] The CPUC officially recognized TNCs and coined the term in September, 2013, when it adopted State regulations governing "an organization whether a company, partnership, sole proprietor, or other form, that provides transportation services for compensation using an online-enabled application or platform to connect passengers with drivers using their personal vehicles."[26] The CPUC justified its regulations by classifying TNCs as charter-party carriers. Charter party carriers provide pre-arranged services for a fee and are subject to regulation by the CPUC.

The number of TNC drivers in California is rapidly growing. For instance, in San Francisco, it is estimated that there are already more than 20,000 TNC drivers versus 9,000 traditional taxi drivers. The taxi fleet itself is divided into 25 companies served by 7 different dispatch companies. Developers entered the market to provide digital taxi-hailing apps, but were limited in their ability to reach all of San Francisco's taxi fleet by having to either contract with each driver or with each taxi dispatch company to obtain access to information generated by the vehicle.

24 Policy Analysis Report regarding Impact of Transportation Network Companies in San Francisco to Supervisor Mar, City and County of San Francisco Board of Supervisors, dated June 9, 2014 (Included in the Appendix).
25 http://www.cpuc.ca.gov/PUC/transportation/Passengers/CarrierInvestigations/CPUC_Proposes_to_Evaluate_Ridesharing_Services_Via_New_Proceeding.htm.
26 See California Public Utilities Commission Decision entered September 19, 2013. Rulemaking No. 12-12-011.

In October, 2012, the San Francisco Municipal Transportation Agency ("SFMTA"), which manages transportation in the City, including the regulation of taxis, issued a Request for Information for a real-time taxi data system to collect and make the necessary data available to app developers, in order to provide the public with access to all taxis via an electronic hail.

The system sought out was required to be able to interface with existing dispatch systems or on-board equipment to provide real-time updates of taxi availability. The SFMTA sought a technical partner to host and run this new "SFTaxi Data" hub as a software service under contract with the SFMTA. The agency also sought to receive feedback on the conceptual design, potential alternative solutions, and data elements required to implement this system. The Request for Information ("RFI") was distributed on October 30, 2012. Companies interested in developing the SFTaxi Data system were asked to respond by letter or e-mail, no later than November 30, 2012, to the following set of questions:

- What direct experience can your company demonstrate with a comparable software solution?
- Please describe your experience with vehicle dispatch and the taxi industry.
- What experience does your company have building real-time transportation monitoring systems?
- What experience does your company have supporting Application Program Interfaces (APIs) to support third party applications?
- Are the data elements described enough to achieve the goals of a robust online dispatch company and regulatory data?
- Can existing dispatch and on-board systems provide the data and use the interfaces described?
- What are the best ways to measure performance of the system?
- What management reports are recommended to allow the SFMTA to undertake regular evaluations of taxi demand and supply by origination neighborhood, time of day, day of week, taxi fleet, destination and other factors?

Frias Transportation Infrastructure, LLC ("FTi") responded to the RFI as the inventor and owner of RideIntegrity. RideIntegrity was intended to be a cloud-based system that was

developed specifically for the purpose of providing taxi and for-hire vehicle regulators with real-time data. The data would be used to: assess the supply and demand for taxicabs; monitor and facilitate dispatch of vehicles to meet consumer demand; implement real time enforcement to alleviate geographic or other discrimination in taxicab supply; enforce taxicab operating parameters, including fare calculation if desired, in real time; enforce taxicab driver licensing, vehicle operating authorization, and other driver rules; and investigate and resolve lost and found cases and customer complaints virtually from a regulatory dashboard designed for that purpose.

After the RFI, FTi and SFMTA executed a five-year contract to use the RideIntegrity system to create an Electronic Taxi Access System ("ETAS"), which was intended to provide public access to all San Francisco taxis through smartphone and internet applications. FTi's software system was to be built to collect GPS and other data from dispatch service permit holders. Through the RideIntegrity platform, all data would be available to any app developer who enters into a use agreement with the SFMTA.[27]

In March of 2013, the Board of Directors of the SFMTA approved rules requiring all motor-vehicle-for-hire permit holders to cooperate with implementation of the platform by allowing the installation of equipment that will collect and provide real-time location and occupancy data to smartphone application developers.[28] These rules also required those with dispatch service permits and color scheme permits (i.e. taxi companies) to cooperate with the implementation and integration with the system. The RideIntegrity system would use this equipment to create a single authoritative data stream that would function as a data-gathering platform, and make the information available to anyone who intends to use it for app development.[29] The RideIntegrity system in San Francisco never fully functioned as it was intended, in part because the taxicab industry fought fiercely against its implementation.

Throughout the process, the SFMTA learned many lessons and is now taking a new direction regarding e-hail functionality and taxi trip data collection. In terms of taxi customers'

27 http://www.prnewswire.com/news-releases/sfmta-moves-forward-with-comprehensive-taxi-app-data-199568111.html.
28 http://www.prnewswire.com/news-releases/sfmta-moves-forward-with-comprehensive-taxi-app-data-199568111.html
29 http://www.sfgate.com/bayarea/article/SF-universal-taxi-app-data-sharing-plan-4371404.php

ability to request a taxi trip through an e-hail app, the SFMTA is letting the market respond. By nature, governmental entities are typically slow to respond to changing technology, and SFMTA is of the opinion that the open market is the best incubator for this type of technology. Instead of developing the e-hail app, the SFMTA has simply established requirements for dispatch services and drivers as well as functional criteria for the app.

On December, 17, 2015, Ed Reiskin, SFMTA's Director of Transportation, sent a memorandum informing dispatch service companies that they, "must affiliate with an e-hail application provider that meets criteria established by the Director of Transportation" in order to comply with Transportation Code Section 1107(c)(7).[30] It stated that each dispatch service must make a qualified e-hail app available to each taxi company with which it is affiliated by February 1, 2016. Qualified e-hail apps must meet the following criteria and performance standards:

- To ensure adequate supply for taxi customers, the mobile application must provide at least 1,000 completed trips per day.
- To ensure adequate response rates, at least 80% of the requests for pick-ups via the mobile application must result in a taxi driver arriving to pick up the passenger within five minutes.
- To ensure adequate customer communication, at least 80% of customers requesting a taxi trip through the mobile application must receive confirmation from the mobile application service that they have been connected with an available taxi within 30 seconds.
- The mobile application must have a documented grievance procedure for drivers.
- The mobile application must have a driver rating feature.
- The mobile application must allow the customer to view available taxis filtered by vehicle type (Ramp Taxi, SUV, or Sedan).
- The mobile application must integrate with SFMTA's Electronic Access Taxi System and report all trips in the required format. Technical specifications are to be made available upon request.

30 https://www.sfmta.com/sites/default/files/notices/2015/FINAL%20SFMTA%20E-Hail%20Criteria%2012-17-15.pdf.

- The mobile application must integrate with the SF Paratransit Debit Card System at no cost to the SF Paratransit Program in the manner prescribed by the SF Paratransit Broker. Technical specifications to be made available upon request.
- The mobile application must provide taxi customers a shared ride option. The shared ride option will allow passengers whose origin and destination are different to share a taxi.

In addition, all drivers are required by law to be logged on to an approved E-hail app at all times while on duty. While all approved apps need to integrate with ETAS to report all trip data, ETAS does not provide a platform for companies to be able to cross-dispatch taxis that are not affiliated with them. . Conversely, nothing in San Francisco's approach limits the number of apps a driver or company can affiliate with, nor prevents one or more apps from affiliating with all taxis in the city; and therefore having the capability to dispatch the nearest available taxi. The Electronic Taxi Access System, SFMTA's taxi trip data collection mechanism, is in the process of being revamped and will function solely as a data collection mechanism. The SFMTA intends to use ETAS for monitoring and enforcement purposes. As San Francisco is in the very beginning stages of this new endeavor, it is at this point unclear how it will further materialize.

B. Chicago, Illinois

The Chicago taxi industry has a long-standing reputation of innovation and pioneering. From the highly-distinctive shade of yellow color markings of taxicabs, which was first introduced in Chicago by John Hertz, who popularized taxi service by painting cabs a shade of yellow, to the founding of some of the oldest taxicab companies in the U.S. – the Yellow Cab Company of Chicago in 1915 and the Checker Cab Manufacturing Company in 1922 - Chicago has played a pivotal role in shaping the taxi industry as we know it today.[31] An oversupply of cabs and poor economic conditions in the 1930s and 1940s laid the groundwork for unionization and regulation. As such, since the early 1930s, the City of Chicago (also the "City") has regulated the number of taxis that are permitted to accept street hails through the medallion system.[32] According to the Chicago Department of Business Affairs and Consumer

31 http://www.encyclopedia.chicagohistory.org/pages/1232.html.
32 http://taxicabtimes.com/gold-plated-medallions-p1378-1.htm.

Protection ("BACP"), there are 6,999 taxicab medallions in the City, with about 6,898 of those currently active.[33] As of April 9, 2015, there were 11,461 certified taxi drivers.[34]

The advent of TNCs in Chicago has had a significant impact on the value of taxi medallions and, as a result, the Chicago taxi market has suffered diminution of value in the past few years. Moreover, the City has also introduced several changes to its taxi ordinances with the aim of modernizing its fleet, increasing service quality, and regulating TNCs. The re-election of Mayor Rahm Emanuel has also a significant impact on the direction of how Chicago and the BACP will continue to enforce various taxi ordinances, and to the extent to which the taxi market will have a level playing field for both TNCs and the for-hire vehicle industry, as well as any resulting impacts on medallion values.

Moreover, in an attempt to create a more level market environment for both taxis and TNCs, on May 4, 2015, the Mayor of Chicago, Rahm Emanuel, through the Department of Business Affairs and Consumer Protection ("BACP") issued a Request for Proposals (the "Chicago RFP") pursuant to the Taxi Fairness Ordinance of 2014, to introduce a Taxicab Dispatch Application "E-Hail" Program (the "Program") to designate internet-enabled applications that will dispatch City of Chicago licensed taxicabs. According to the Chicago RFP, the goal of the Program is to improve the experience of the taxicab riding public by promoting modern methods of procuring taxicab services that are reliable, secure, and easy to use by the general public. The Program will also require City of Chicago licensed taxicabs to accept dispatches through internet-enabled applications, and allow passengers to electronically hail licensed Chicago taxicabs.

The City of Chicago held a pre-proposal conference on May 15, 2015, in which interested parties could attend and ask questions about the bidding process and requirements for the Chicago RFP to be submitted by May 22, 2015. As a result, the City posted an addendum to the Chicago RFP with the answers to the submitted questions on May 29, 2015. Follow-up

33 Information provided by the Chicago BACP.
34 https://data.cityofchicago.org/Community-Economic-Development/Public-Passenger-Vehicle-Licenses/tfm3-3j95. (July 16, 2015)

questions were sent and their responses were posted on June 11, 2015. The proposals were then due on June 15, 2015 for consideration.

The Chicago RFP stated that it would qualify one or more E-Hail Apps that best meet the requirements of the City as eligible for use with this Program. The taxicab industry is not prohibited from using applications other than E-Hail Apps designated pursuant to the Chicago RFP; however, use of any non-designated application does not satisfy the Program requirements that taxicabs must use at least one of the City-designated Applications. The Chicago RFP set out specific and detailed requirements for respondents to fulfill to be eligible for consideration. Proposals were to include a comprehensive plan for implementation and management of the app, including marketing strategies. In addition, the Chicago RFP set out mandatory functional features for the App, as well as preferred but not required functions. The following are some of the functionalities that were required to be integrated with the app:

- The E-Hail App will allow customers to save pick-up/drop off preferences upon customer request;
- The E-Hail App must dispatch nearby licensed City taxicab(s) regardless of the affiliation or taxicab medallion license holder;
- The E -Hail App must estimate wait time for prospective passengers, and the wait time must be prominently displayed prior to passengers accepting rides;
- The E -Hail App must not make available to the driver any details about the passenger's trip itinerary, besides pickup location, prior to the trip request being accepted;
- The E-Hail App must allow the taxicab driver to receive dispatch instructions/requests on a readily available internet-enabled device;
- The E-Hail App must provide customers with a receipt via email or on the E-Hail App upon request;
- The E-Hail App must require a driver signing onto the system to acknowledge that the driver will act in compliance with all laws and City of Chicago rules when using the system; and

- The E-Hail App electronic payment system must be integrated with the taxicab meter.[35]

On January 6, 2016, the Mayor announced that the City had chosen two app providers, Arro and Curb, to provide the Universal Taxi App in Chicago.[36] Taxi drivers will have to sign up with at least one of the two apps to be in compliance with the new City laws. The contracts with Arro and Curb are for one (1) year and three (3) optional extension periods of one (1) year each, to be exercised in the sole discretion of the Commissioner of the BACP. All taxi drivers were required to use either Arro or Curb through their in-vehicle tablets or dispatch equipment starting February 1, 2016. On February 8, 2016, the City of Chicago announced a marketing campaign to promote the City's e-hail program to the public.[37]

C. Los Angeles, California

The City of Los Angeles Department of Transportation has nine (9) licensed franchise taxi operators who operate more than 2,300 taxis.[38] Los Angeles has a reputation for being a difficult city to hail a cab on the street.[39] Thus, most rides are arranged by phone dispatch.[40] In 2014, as a result of the growth of TNCs, Los Angeles cab companies reported a 21 percent drop in ridership.[41] In response, on January 15, 2015, the Los Angeles Board of Taxi Commissioners voted unanimously on an order to institute an e-hail app program. According to Los Angeles Taxicab Commission President Eric Spiegelman, the plan was to pool all of the city's taxi drivers onto one app-based taxi marketplace, and then allow third party developers to create their own passenger apps that connect to the taxi marketplace.[42] Any app that wished to let passengers call a cab will have access immediately to the entire fleet.[43] The idea was to encourage competition on the passenger side of the equation while providing stability and density on the driver side.[44] Spiegelman felt that "[t]he more apps that compete for passengers, the more money that finds its

35 http://www.cityofchicago.org/content/dam/city/depts/bacp/rfp/ehailapprfpfinal050415f.pdf.
36 http://www.cityofchicago.org/content/dam/city/depts/mayor/Press%20Room/Press%20Releases/2016/1.6.16 UniversalTaxiApp.pdf.
37 http://www.cityofchicago.org/city/en/depts/bacp/provdrs/vehic/news/2016/february/taxiapps.html.
38 http://www.taxicabsla.org/.
39 http://la.curbed.com/archives/2015/01/los_angeles_taxis_will_have_a_mandatory_app_starting_in_august.php.
40 http://www.newyorker.com/business/currency/city-los-angeles-plans-make-taxis-like-uber.
41 http://www.reuters.com/article/usa-taxis-california-idUSL1N0UU2R520150115.
42 http://sharedusemobilitycenter.org/news/innovator-profile-eric-spiegelman-los-angeles-taxicab-commission/.
43 *Id.*
44 *Id.*

way into taxi driver pockets."[45] The order required every driver and taxicab to sign onto a City-certified e-hail app by August 20, 2015, or face a fine of $200 for every day they were not in compliance.[46] The details of the app functions and the certification process were not announced as part of the order.

After further consideration, the LADOT found the project too ambitious and did not follow through. The Commission could still provide requirements for taxicab operators to use their own applications, so long as the apps meet any operational and reporting requirements. However, the Commission has not elected to make one government branded app, as the technology is constantly changing. The private taxi companies have their own apps but are not very successful. Most taxi operators are using one or two apps at present with very few trips generated from the apps.

D. Montgomery County, Maryland[47]

Montgomery County is located on the Washington, D.C. border and is Maryland's largest jurisdiction, including well-known areas such as Bethesda, Silver Spring, Rockville, Gaithersburg, Germantown, Takoma Park, and Friendship Heights. The county has approximately one million residents, 500,000 jobs, and an annual budget of $5 billion. Montgomery County's almost one million residents span an area of 495.52 square miles.[48] Although most residents drive to work (79.8% drive alone or carpool), a large portion of residents (12.6%) rely on public transportation, including taxis. Taxis serve a wide range of customers, including visitors to Montgomery County, seniors, physically-challenged residents, and corporate clients.

Montgomery County regulates the taxicab industry within its borders pursuant to Chapter 53 of the Montgomery County Code. Each taxicab must possess a County issued Passenger Vehicle License ("PVL") and any person who drives a taxicab must possess a valid taxicab driver identification card. There are approximately 770 licensed taxi cabs in the county, and this

45 *Id.*
46 http://www.reuters.com/article/usa-taxis-california-idUSL1N0UU2R520150115.
47 http://councilmemberriemer.com/taxi/#top.
48 U.S. Census Bureau, 2009a.

number is expected to grow, as regulators seek to "level the playing field" between the County's established cab companies and TNCs, which have entered the scene. [49]

As the usage of TNCs expands in Montgomery County, taxi drivers are forced to compete more and more with this new technology. Taxi companies, drivers, and regulators across the world have begun seeking out ways to improve taxi service, including by attempting to import many of the features unique to TNCs such as smartphone apps, GPS tracking, electronic payment, robust rating systems, and dynamic pricing into their own dispatch systems. As a result, taxi fleets have been developing or buying branded apps and upgrading their dispatch systems; in some cities even banding together to offer a new app. "Aggregation" apps have also started to appear, which allow users to compare multiple services in one centralized interface.

In October 2014, the Montgomery County Council began considering how to modernize its taxi code, and adapt its for-hire vehicle market, to incorporate the growth and expansion of TNCs. It was at this time that Councilmember Hans Riemer introduced a bill to develop a universal taxi app for Montgomery County. Initially, Councilmember Riemer's proposed bill which was closely based on Chicago's approach, relied on the County Department of Transportation (the "County DOT") to select a vendor to develop and run a single universal app, which all taxi drivers would be required to use. After conversations with the County DOT and multiple industry stakeholders, Councilmember Riemer proposed an alternative approach which relies on an open data standard.

The new proposal authorizes the County DOT to approve multiple universal private sector taxi apps as long as they each provided an open data feed so that each app is able to locate and dispatch all 770 licensed taxis in Montgomery County, regardless of which company a particular car is affiliated with or which app the driver or customer used. This is possible through the required use of an Application Programming Interface ("API"), which essentially establishes a common language through which all other approved systems can communicate to share data and to dispatch any available taxi. This is the most important prerequisite an applicant must

49 http://www.bethesdamagazine.com/Bethesda-Magazine/November-December-2015/Barwood-Taxi-Cabs-vs-Uber/.

show in order for their app to be granted approval. The proposal requires all county drivers to use an approved app, but allows drivers to choose any of those approved by the County DOT.

Councilmember Riemer also argues that if other jurisdictions adopt similar rules, it will create an incentive for private companies to agree on a universal specification and create a broad system of taxi-based apps. He reasons that a universal protocol providing tech companies with access to all taxis could become a platform for further innovation. "Entrepreneurs with an idea for making for-hire transportation more efficient can build an app, get it approved, and put it on the market with access to every taxi in jurisdictions across the country, without needing the capital or expertise to build a network of their own drivers (and worry about benefits, background checks, insurance, or liability)," said Councilmember Riemer. Under this market-based approach, apps that offer the best prices, features, and experience will flourish, rather than government picking winners and losers. This allows new innovations to be implemented as quickly as entrepreneurs can come up with them, without waiting for a lengthy government procurement process.

While this is a new idea for taxis, Councilmember Riemer points to Google's open-source General Transit Feed Specification as an excellent example to draw on in the public transportation arena. Google's General Transit Feed Specification ("GTFS"), which has become the almost universally accepted format for publishing transit data, allows jurisdictions across the world to publish their transit routes, schedules, real-time arrivals, and other information in a GTFS-compliant data feed, from which developers are able to easily use that data in applications. This means that anyone who creates an app is able to incorporate real-time data, such as subway, train, or bus schedules, and if this program is successful, taxi locations and other real-time data. There is even discussion that a nationwide API taxi data feed could be recognized, creating an ecosystem for any innovator who has an idea for safe and regulated transportation. Whether it is for package delivery services, new ridesharing programs, or for any other reason a person might need a car and driver, anyone can develop an app that would have access to a nationwide, or potentially international, fleet of taxis and drivers that are locally regulated. This eliminates concerns over insurance, background checks, and other issues that arise when using unregulated private vehicles for-hire.

Under Montgomery County's approach, private businesses will have the onus of investing to develop and market their apps, and the surrounding technology.[50] Initially, there will be no restrictions on the business model for apps in terms of credit card processing, advertising, or purchase costs for use of the app. Fares will continue to be calculated using either a traditional taximeter or the recently introduced "smartmeter", but the apps will not be required to interconnect on fare collections. This means that people can elect to pay through the app or to pay cash to the driver. Private ownership and competition among apps means the County does not need to market an app, pay to develop the technology or process data, or consider who retains ownership and control.

This proposal was included in the omnibus taxi reform bill, which was unanimously passed by the Montgomery County Council in July 2015, and the Montgomery County DOT is now tasked with developing regulations to implement the legislation. Other requirements included in the legislation that must be considered when drafting the regulations include:

- Adequately protect the privacy of passengers and the security of passengers and drivers;
- Allowing only licensed taxicab drivers to use the system;
- Maintaining, and making verifiable records available to the Department of Transportation upon request;
- Providing users with an option to see and request an accessible taxicab; and
- Accessibility for the blind, visually impaired, the deaf and hard of hearing.

Numerous technology companies, including IT Curves and Hitch, have shown interest in Montgomery County's universal taxi app, and have begun conversations with the County about developing technology or introducing an existing app for approval.[51] A definitive plan for establishing a standardized API has yet to be determined. Two options which have been discussed include allowing the first approved app system to establish the API standard that all subsequent apps must communicate using, or the County government approving an API developed by a technology non-profit, such as oHail, as the universal standard that all app

50 http://councilmemberriemer.com/taxi/. Additional information obtained through conversations with Montgomery County Councilmember's Staff on February 5, 2016.
51 http://www.itcurves.net, http://www.hitchdc.com/Rider.html.

systems must use.[52] Once the regulations are completed and the first app has been approved, all drivers will have a 6-month window to begin using one of the approved apps. The regulations are expected to be completed by March or April of 2016, and there is hope they may be approved in the April/May budget period; otherwise it will likely be delayed until summer of 2016.

E. New York City, New York

Taxicabs are a vital part of New York City's transportation ecosystem. The New York City Taxi & Limousine Commission ("TLC") licenses and regulates over 13,600 taxicab medallions and over 8,000 "green" street hail vehicle licenses, which are only permitted to accept street hails from outside of the Manhattan Central Business District. In response to the rise of app companies in New York City, whose vehicle license count now exceeds 30,000, there have been two approaches to create an e-hail app that would be used with the city's taxicabs. The first approach was bill number 574 ("Introduction 574" or "Int. 574") by City Council Member Benjamin J. Kallos, to create a single application for hailing taxis.[53] The second was a pilot program by the TLC that allowed multiple third party-created applications to use taxicabs.

Int. 574, which was created in 2014, would have required the TLC to develop or license an e-hail application which would allow customers to electronically hail a yellow taxicab or a green street hail vehicle. In addition, the application would be the only application that could be used by yellow taxicabs or green street hail liveries to accept electronic hails. This bill would require that the application be capable of allowing customers to electronically hail an accessible vehicle, as well as the ability for third party applications to submit electronic hail requests to drivers through the application. This bill did not receive enough support from the Mayor's office and never received a vote by the City Council, due in part to the TLC rolling out its own e-hail pilot program.[54]

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52 http://www.ohail.org. "As major cities… look to create their own smartphone apps for hailing taxis and riders have an ever increasing array of options for hailing a private car it's time we look at creating an open standard so that hailing a taxi, private car, paratransit, or rideshare can be part of common infrastructure where apps can be used across cities and service providers. We've already seen this work with mass transit using standards like GTFS and with civic service requests using standards like Open311, let's see if we can do this for catching a ride too."
53 http://www.theepochtimes.com/n3/1132832-city-asks-taxi-regulator-to-create-universal-e-hail-app/.
54 http://www.businessinsider.com/new-york-city-taxis-could-get-their-own-app-to-rival-uber-2014-12.

In 2012, the TLC adopted a year-long pilot program that allowed the usage of taxi-hailing applications that are approved by the TLC.[55] This pilot program differs from Int. 574 by allowing the use of multiple applications to hail taxicabs, as opposed to having one application. The pilot program was originally designed to run from April 2013 through April 2014, but was delayed due to a temporary restraining order, and extended to run until 2015 when the restraining order was lifted.[56] In January 2015, the e-hail rules used during the pilot program were passed unanimously.[57] These applications must follow certain rules, including the following[58]:

- Participants must integrate their payment systems with the taximeter installed in taxicabs;
- The e-hail request can only be accepted by a driver who is 0.5 miles away from the requester if the request is made inside the Manhattan Central Business District (south of 59th Street). If the request is made outside of this region, the request can only be accepted by a driver who is 1.5 miles away;
- No information about the passenger is transmitted to the driver, except that a passenger's trip identification number or username may be transmitted; and
- The application must be programmed to prevent a taxicab driver from accepting a ride while the taxicab is in motion.

F. Tampa, Florida

The Public Transportation Commission (the "PTC") has been researching the possibility of a universal application for about two years.[59] The model to be used for implementation is to create an app that allows the user to access all forms of transportation available in the greater Tampa Bay market, select the mode of required transportation, and have a listing of all permitted and licensed vendors available. The next step would be to select the vendor and request a ride (similar to the Uber app) that can be tracked via Google maps. The PTC has been unable to secure a vendor and did not offer a Request for Proposals ("RFP") (primarily because of the cost

55 http://www.wnyc.org/story/283323-nyc-likely-to-approve-taxi-e-hail-apps-on-temporary-basis/.
56 http://www.nyc.gov/html/tlc/downloads/pdf/e_hail_pilot_extention_final_resolution.pdf.
57 http://www.nyc.gov/html/tlc/downloads/pdf/minutes_01_29_15.pdf.
58 http://www.nyc.gov/html/tlc/downloads/pdf/ehail_pilot_res_final_as_passed_12_13_12.pdf.
59 Information obtained through conversations with Public Transportation Commission Staff on February 26, 2016.

of authoring such a unique app).[60] This approach was selected because the PTC desired to create a market place that the PTC regulated, minus any associated costs. TNCs, or any company for that matter, could choose not to participate. The thought behind the creation of a marketplace was to entice both companies and drivers to join the marketplace in order to be successful.

The PTC was going to pay the start-up costs, and it was proposed that some form of fee would be added to each ride to pay for maintenance over time.[61] For the most part, drivers are receptive to the idea, with concerns about costs associated directly to them.[62] Companies had the same concerns.[63] Those concerns were largely put to rest when they were presented with the idea of passing the cost onto the consumer in the form of an IT Fee.[64]

The key purposes of this app were to encourage a free marketplace and not become involved in the cost/profit issues. The model would be driven solely by level of service. The PTC would reserve the right to remove bad actors from the app, applicable to both companies and drivers. There are currently no rules in place to govern such an app, so the PTC was prepared to create the new rules from scratch. Unfortunately, the process was stopped, due to the significant cost of implementation - over $300k to get started.[65]

G. Washington, D.C.

The District of Columbia ("D.C.") has a vibrant taxi market that is overseen by the District of Columbia Taxicab Commission ("DCTC"). The DCTC provides services to approximately 8,500 taxicab drivers including 1,400 independent owner operators and 116 taxicab companies who together operate 6,500 taxis and 103 independent limousine drivers and 27 limousine companies. On October 8, 2014, the DCTC Chairman announced a proposal to adopt a universal taxi app as a requirement for all D.C. taxis to use. Taxi drivers would be allowed to use other apps in addition to the mandated app. The app is called the "DC Taxi App" and is available on the App Store and Google Play. It was procured by the District of Colombia

60 *Id.*
61 Information obtained through conversations with Public Transportation Commission Staff on February 26, 2016.
62 *Id.*
63 *Id.*
64 *Id.*
65 *Id.*

from Triage Group through a Request for Quote ("RFQ"). The app allows for customers to save their credit card information for easy electronic payments, and through integration with the meter systems it also leaves the option for cash and in vehicle credit card payments.

This application is currently the property of the District of Columbia. DCTC has enacted regulations to license and transition operations of the app to a cooperative association of companies and individual vehicle owners in the industry. The co-op, which is expected to be up and running within the next few months, will manage the operation of the app, be responsible for marketing the service to the public and set the charges. The app began public beta testing in March, 2015, and had a soft launch in October of 2015.

H. Canadian Cities

In most Canadian cities, including Montreal, taxi companies or independent drivers have either partnered with an existing e-hail dispatch company such as eCab, or have developed their own personalized app. In cities like Sherbrooke, Quebec, or Quebec City, Quebec, where the market is characterized by one major company that oversees most of the taxis in the city, their personal apps can function as a type of universal app for the city. In Sherbrooke the major company is Taxis de Sherbrooke, boasting 85 vehicles, with an app by the same name, released in 2015.[66] Taxi Coop dominates the industry in Quebec City, using an app also by the same name that also launched in 2015.

Vancouver's taxi industry is made up of four cab companies that collectively have almost 700 licensed taxi vehicles. Taxis in Vancouver are provincially regulated. No TNCs operate in Vancouver or in the entire province of British Columbia. In September of 2015, the four companies came together to launch one app for all taxis in Vancouver called "eCab". eCab will dispatch the nearest taxi regardless of company affiliation. The eCab app allows customers to pay online and rate their driver. eCab also has the added benefit of being operational in 6 countries and 30 cities, including Toronto, Paris, Brussels and Delhi, with plans of reaching 9

66 http://www.taxisherbrooke.com/en/company.

countries and 50 cities in the near future.[67] eCab is also a Partner in the UpTop Global Taxi Network, further described below.

67 https://www.e-cab.com/en/ecab-alliance/.

IV. ANALYSIS OF REGULATORY APPROACHES

A. Approach: Multiple Government Sanctioned Applications

The multiple government sanctioned application approach involves the government approving multiple companies to provide applications to be official government sanctioned apps. All taxi drivers are required to use at least one of the approved apps at all times while they are on duty. This model was recently adopted by the City of Chicago. After a year-long RFP process, the City chose two companies to provide the official taxi apps. The apps are privately owned and managed. The government's sole role is to approve the app according to a set of accepted requirements, and to mandate and enforce the usage of the app by the taxis. In Chicago, the drivers receive notification of the e-hails through in-vehicle equipment or tablets, through which payment is also received. Alternatively, this approach can also be implemented by requiring taxi drivers to download one of the government approved apps to their smartphones during their shifts.

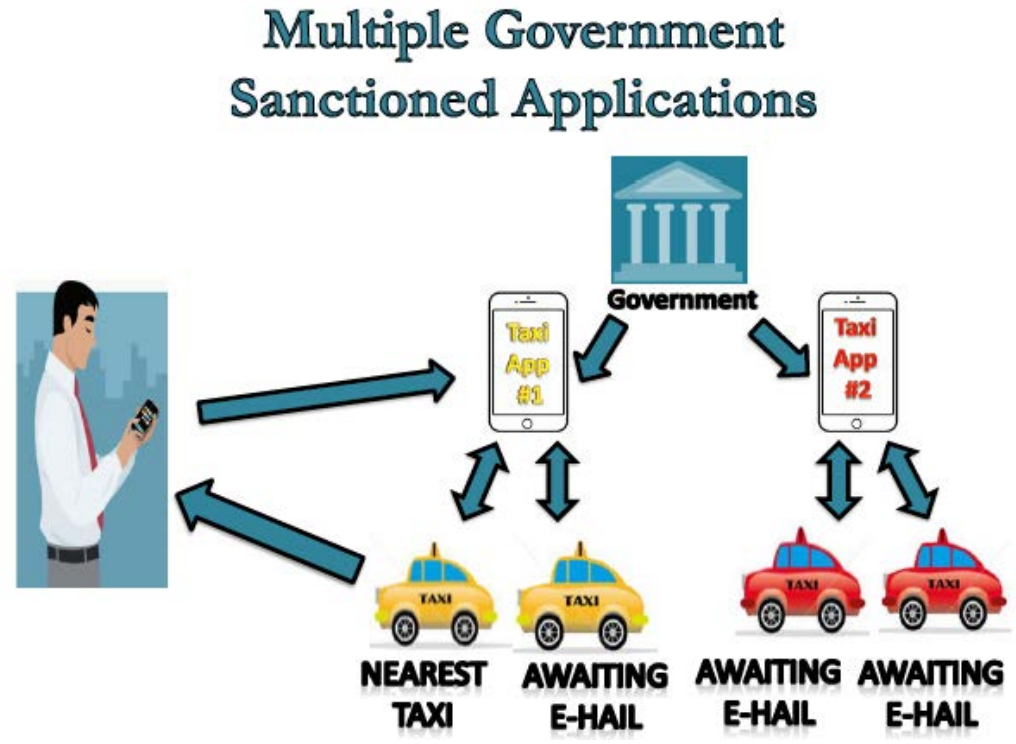
Benefits of this approach include a decreased government burden in creating, maintaining or marketing the app. Approved app companies shoulder the burden, with the added benefit that the government is able to set the framework within which the apps operate, and retain oversight. By allowing multiple apps to operate simultaneously as official apps, and only mandating that each driver use a minimum of one of the apps, there could be fewer drivers per app. Consequently, unless one of the apps attracts all of the drivers, none of the apps becomes truly universal. Customers therefore could not obtain full access to the city's entire fleet through any one app.

In order to implement this approach the government could choose a procurement process through an RFP, similar to what the City of Chicago undertook. Alternatively, the city could choose a licensing scheme in which any app company that would like to dispatch to taxis through their app would apply for a license from the city to do so. The difference between the two implementation methods, is that through the RFP process the city chooses which apps it thinks are best, while through a licensing scheme, any app that meets the requirements set by the city

would be awarded a license. In either method, legislative changes will have to be made to mandate the usage of apps by the drivers, and to set out the requirements for app approval.

The cost of implementation differs with each method; an RFP will render a specific contract cost while a licensing scheme will render a variety of other costs. The licensing scheme would most probably yield a higher cost to the government as it would require ongoing increased staffing. On the other hand, the RFP would need to be re-visited periodically, with ensuing additional costs as well. Overall, however, this method is a less costly option then the city having to develop its own app since most of the cost burden of implementing and operating the app would fall on the private sector.

The time it would take to implement this approach depends mainly on the speed of the legislative or rulemaking process in the City to pass the necessary regulations for implementation. As stated, Chicago took about a year from announcing the RFP to full implementation of the program. A licensing scheme might take less time to implement if the regulations are passed quickly, and the licensing process is streamlined so that apps may begin operating instantly upon approval.



B. Approach: Single Government Branded Application

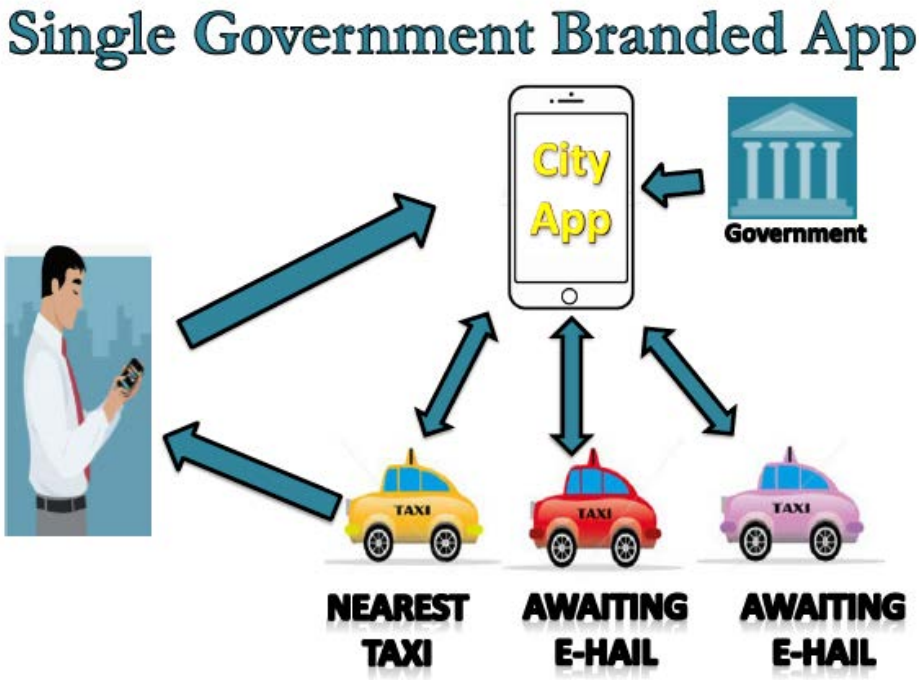
A single government branded application approach gives the municipality complete control (and burden) of the creation, cost, and implementation of a taxi e-hail program. This approach might be the most literal example of a "universal app". Under the Single Government Branded Application approach, the government creates and requires just one taxi e-hail app that each driver would be required to download, and through which consumers could have access to the City's entire taxi fleet. Since the tracking technology is already a part of most big-city cab fleets, and most cities already require credit-card readers, the technological backbone is already in the cars for cities to get into the ride-share business.

In order to implement this approach, the government would likely hire a company to develop the app, the cost of which would fall on the municipality. Similar to the approach implemented by D.C., the application can be procured from an outside contractor through a Request for Quote or other appropriate procurement method. The single app approach would encourage low prices between companies competing for the procurement bid. The app would become the property of the government, and it would be the government's responsibility to maintain and market the application. Technically, this application would allow for customers to save their credit card information for easy electronic payments, but also leaves the options for cash and in-vehicle credit card payments.

It also would be beneficial to the city implementing this technology as it would let them collect travel data and help improve access to service in neighborhoods that have been underserved. If drivers had confidence that they could find return fares from places with less busy street traffic, it would likely encourage drivers to make more trips to underserved areas. This option could also be an excellent revenue source for a city that wishes to sell advertising through the application (advertisements can appear on smartphone screens generating substantial revenue to operators) or use the tracking data and rider smartphone feedback to improve enforcement. Of course, most importantly, consumers have the convenience of being able to hail the entire universe of cabs right on their phones from a single application. This application would serve as competition for transportation network companies. The government branded app would make the entire city's fleet of taxis available, rather than just a portion of them.

There are also downsides to this approach. Unfortunately, competing with other TNCs in the city would be both a positive and a negative for a government branded application. On the one hand, a single app would be convenient for the city, fleets, and consumers. On the other hand, the app would struggle to compete with the continuous updates being made by TNCs. Private companies have the advantage of churning out new and improved software, swiftly and often, to compete with one another. Unfortunately, a government sponsored program may not move at the same private sector pace necessary to compete with other TNCs. A government application may quickly find itself outdated, especially in this new age of technology.

The time it would take to implement this approach depends mainly on the speed of distributing an RFQ or RFP, and time it would take the legislative process or rulemaking in the City to pass the necessary regulations for implementation. A single government branded application is one of the ***moderate*** cost options for a municipality attempting to create a centralized taxi app. The, the local government will incur costs to oversee the process, draft necessary legislation and regulations, establish and complete approval processes, and conduct enforcement efforts. This restrictive approach requires more detailed rules and may involve significant procurement contract costs.



C. Approach: Single Government Branded Application (with Competing Applications)

The single government branded application with competing applications approach is the current approach being utilized by Washington, D.C. This method mirrors the Single Government Branded Application approach, except that the government would allow taxi drivers to use other apps in addition to the application mandated by the municipality. Similar to the previously described approach, the government would procure a company to develop a government branded application, the app would be the property of the government, and it would be the government's responsibility to maintain and market the application or as D.C. is planning to hand it over to an industry cooperative. Fleet drivers would be required by law to use the government app at all times while on duty but are additionally also allowed to used commercial apps.

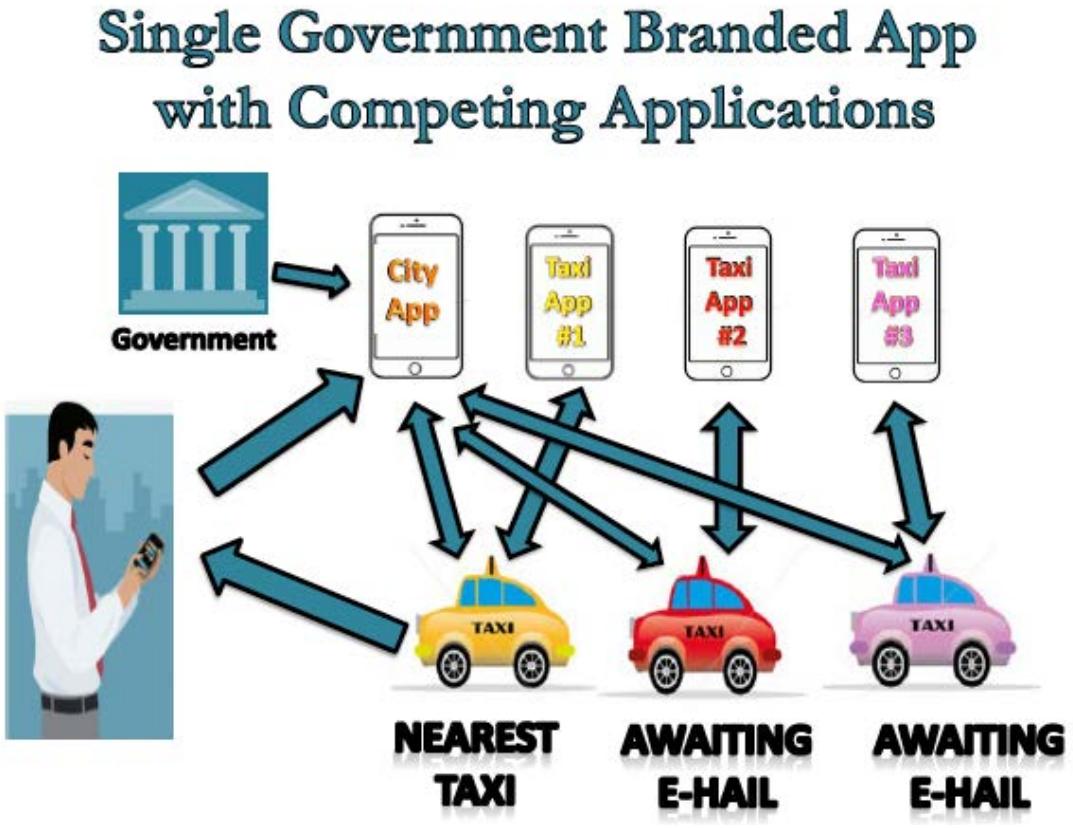
Consumers could, of course, download either the government branded app or a privately owned app, but this option would not have a shared platform through which all taxi GPS data is shared between applications. This means that consumers would not be offered the option of the entire fleet of taxis when logging into the non-government applications, but rather, the only taxis available on each app would be those fleets which have selected that specific application. If very few consumers use the government branded app, if it is inferior in quality, then it will not effectively function as a regulatory tool in the app market, and the money and resources invested into the project will have gone to waste.

Because this option does not have an open platform, under which all apps will be required to share data, the apps will not have the ability to cross-dispatch with taxicabs affiliated with other apps.[68] However the government app will have the competitive edge since it will be the only app with access to all the available drivers.

The implementation time and cost is estimated to be similar to the implementation time and cost for the single government branded application approach, because the government will be going through the same steps to implement their application, while allowing other private

68 http://councilmemberriemer.com/taxi/. Additional information obtained through conversations with Montgomery County Councilmember's Staff on February 5, 2016.

companies to develop applications at their own cost. Again, a single government branded application is one of the ***moderate*** cost options for a municipality attempting to create a centralized taxi app. The, the local government will incur costs to oversee the process, draft necessary legislation and regulations, establish and complete approval processes, and conduct enforcement efforts. This approach requires more detailed rules and significant procurement contract costs.



D. Approach: Open Shared Platform (with or without Government Application)

An open platform approach to a centralized taxi app allows the local government to approve multiple private sector taxi apps, as long as they each provide an open data feed so that each app is able to communicate on an open platform to locate and dispatch all licensed taxis, regardless of which taxi company a particular vehicle is affiliated with, or which app the driver

or customer is using.[69] This approach relies on four essential elements in order to successfully establish a centralized app: (i) an open data standard must be established as a platform for apps to communicate; (ii) it must be mandated that only apps which communicate using the open data platform can be approved by the local government, (iii) it must be mandated that all taxi drivers use an approved app; and (iv) any approved app on the open data platform must be capable of cross-dispatching the nearest taxi, regardless of the taxi company or app it is affiliated with. This would essentially allow any app using the common Application Programming Interface ("API") to have access to a centralized pool of shared data and act as a universal app, dispatching any nearest taxi; including those only affiliated with other apps.

The establishment of an open data platform through which information can be shared is possible through the required use of a standardized API by all approved apps. An API essentially establishes a common language through which all apps using it are able to share data about the drivers and vehicles affiliated with the app, and to dispatch any available taxi using an electronic hail. This is the most important prerequisite an applicant must show in order for the app to be granted approval, because it gives all apps the ability to centralize and share taxi locations and other data on a single open platform.

It is also essential, when using an open platform approach, that all drivers are mandated to use an approved app. While drivers can be free to choose any of the approved apps, the mandate ensures that data from every licensed taxi vehicle is centralized and shared. Without the mandate, the open data platform will only include information from the limited number of taxis that may elect to use an app that is compatible with the standardized API. This would reduce the overall effectiveness of a centralized app because it would not allow the greatest advantage of taxicabs, namely their ubiquity, to be effectively utilized in competition against transportation network companies. Right now, taxi services in most jurisdictions are often competing against each other for business as opposed to pooling their resources to compete against the relatively new and often disruptive market entrants: TNCs.

69 http://councilmemberriemer.com/taxi/. Additional information obtained through conversations with Montgomery County Councilmember's Staff on February 5, 2016.

While the open platform approach is new for taxicabs, Google's open-source General Transit Feed Specification has become the almost universally accepted format for publishing transit data.[70] It allows jurisdictions across the world to publish their transit routes, schedules, real-time arrivals, and other information in a GTFS-compliant data feed, from which developers are able to easily use that data in applications, such as Google Maps. Under the open data platform approach, anyone who creates an app will be able to incorporate shared data, such as subway, train, or bus schedules, or taxi locations and other real-time data.

This approach is unique in that it decouples the idea that passengers and drivers must connect using the same app and allows apps to cross-dispatch taxis that are affiliated with, or using other approved apps. The shared open data standard is currently being considered by Montgomery County, Maryland, U.S., in its attempt to implement the use of a universal taxi-hailing protocol.

Open Shared Platform with Government Branded App

The open shared platform approach is very flexible in that it allows anyone to develop an app. As long as an app can communicate with the other apps on the platform, it can be approved for common use. This means that the local government also has an option under this approach to develop its own branded app, or brand an existing app, as the official local taxi app. This official government branded app could function on the open platform, as would any other approved private e-hail app. The government branded app could be required to e-hail the nearest taxi to the users' location, regardless of the taxi company or e-hail app that taxi is affiliated with.

The government app would also compete for usage among consumers. In order for the app to remain viable among competition with continuously innovative private apps, the government must continuously update the app so it does not grow stale as new innovations are introduced to the overall app market. In a loosely regulated market for taxi apps, a government branded app could provide the government with some ability to regulate the other actors. For example, a government app could step in and reduce their own fees in order to undercut private

70 http://councilmemberriemer.com/taxi/. Additional information obtained through conversations with Montgomery County Councilmember's Staff on February 5, 2016.

apps who have run amok with high booking fees; and drive the price down for consumers. Consumers would have the option of abandoning their approved private app to use the government branded app when the private apps are not providing fair prices, quality service, or new features.

The government branded app could potentially function as a standard bearer for what features e-hail apps could provide and at what price. If the market was not providing quality apps at fair prices, those apps would be forced to improve or go out of business, because users would simply switch to using the more reliable and affordable government app. Using a government controlled and branded app could give the local government a useful and nimble regulatory tool without having to pass complex, detailed, and static rules regulating the e-hail app business model.

On the other hand, unless money or resources are invested to continuously update and improve the government app, it could become obsolete in comparison to faster developing private apps. Similar to the previously described single government branded application with competing application approach, if few consumers use the government branded app because of its inferiority, it will not effectively function as a regulatory tool in the app market, and the money and resources invested into the project will have gone to waste.

A government branded app could be especially useful while open data platforms are still developing. It is unlikely at this time that travelers will be able to go from one city to another and be able to use a single taxi e-hail app in every location. But if the user is easily able to search and download a government branded app that is able to e-hail all taxicabs licensed in the jurisdiction, the user does not need to download and attempt to use a variety of private apps that may not have been approved in his/her area. Downloading the government branded universal taxi app would be a simple, user friendly way for travelers to have instant access to a regulated fleet of taxis to serve their transportation needs, while on business or vacation.

One of the biggest benefits of an open platform approach, under which all apps will be required to share data and conduct e-hail operations using a standardized API, is that apps will

have the ability to cross-dispatch with taxis affiliated with other approved apps.[71] This means that when an e-hail request is sent from an app user, the nearest taxi will be summoned, regardless of its app or company affiliation. This would even allow the Uber taxi app to be approved and integrate using the standardized API, meaning that when someone was using the Uber app, they would have the option to e-hail the nearest traditional taxi from any licensed company in the jurisdiction. Under this model, taxicabs would be required to use an approved app, which will allow the entire market of taxicabs to compete as a whole against TNCs, rather than as disjointed smaller companies with their own app affiliations.

If other jurisdictions adopt similar rules, it may create an incentive for private companies to agree on a universal specification and create a broad system of taxi-based apps. A nationwide taxi data feed could be recognized, creating an ecosystem for any innovator who has an idea that utilizes or improves for-hire transportation (i.e. new delivery services, or ridesharing programs). Once approved, any app could connect to every regulated taxi, eliminating the need of an app company to build a fleet or hire drivers (or conduct background checks, provide insurance, etc.). This model could also open new potential revenue streams for the taxi industry by inspiring new transportation service ideas that utilize taxis and the platform, through analysis of the data.

Under a market-based open platform approach, apps that offer the best prices, features, and experience will succeed, rather than government picking which apps win or lose. This allows new innovations to be implemented as quickly as entrepreneurs can come up with them, without waiting for a lengthy government procurement process. New features and technologies can be easily introduced into the app market, and consumers will not be stuck with one or two subpar apps. The government would not need to invest to improve or develop technology, as open access and private sector competition will drive new innovations. The open platform approach provides more flexibility to react to shifts or trends in the industry, as any app with any feature can be approved and immediately communicate with all taxis.

Private ownership and competition among apps means the government would not need to market an app, pay to develop the technology or process data, or consider who retains

71 http://councilmemberriemer.com/taxi/. Additional information obtained through conversations with Montgomery County Councilmember's Staff on February 5, 2016.

ownership and control.[72] A market based implementation would also reduce the cost of implementation because private companies would be tasked with developing the platform and app technology, as opposed to a government procurement process resulting in a contract to develop the technology.

The most glaring potential negative in using an open platform approach is uncertainty as to the development of the universal protocol and other technology. If a locality elects to use a procurement process and pay a company to develop a platform or government branded app, this costs more and requires ongoing efforts to maintain. On the other hand, if a locality does not contract to develop their own branded app or a platform which all approved technologies must use, and allows the first entrant to set the platform standard, then the locality surrenders a degree of control which may leave the system vulnerable to future market shifts or unforeseen problems.

Additionally, transportation department staffers may become less invested in the project development under a market-based approach, creating less accountability and reducing prioritization. Moreover, when private industry is tasked with developing these technology systems with little government oversight, department staffers may be required to write additional regulations in an attempt to set price or quality standards and provide market safeguards. If the policy regulations and technology system developments are not intimately intertwined, regulations may fail to keep pace with innovation, stifling progress and exacerbating market inefficiencies.

The options for implementing an open shared taxi data platform can be simplified into two basic methods; promoting a commercial solution or contracting to develop one. Regardless of which method is selected, every jurisdiction will need to pass a law enabling the creation of the platform, and pass further regulations to ensure that all approved apps can communicate on the platform, and require that all taxis use an approved app, among other necessary regulations

72 http://councilmemberriemer.com/taxi/. Additional information obtained through conversations with Montgomery County Councilmember's Staff on February 5, 2016.

(i.e. accessibility requirements, etc.).[73] This will establish the basic framework necessary for taxis to compete with TNCs using an open platform centralized app.

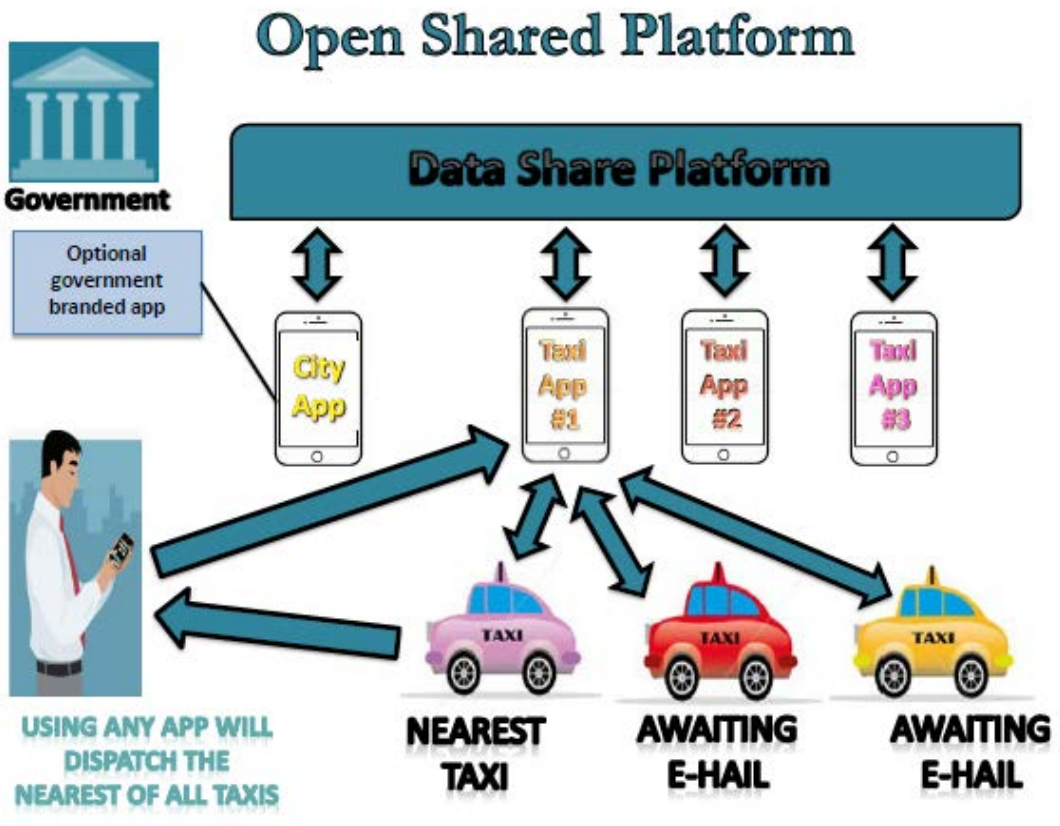
Under Montgomery County's approach, private businesses have the onus of investing to develop and market their apps, and the surrounding platform technology.[74] In establishing a common platform, two options have been discussed: the County will either approve an app as the first market entrant, which establishes an API standard that all subsequent apps must communicate using; or the County government will require that all apps use an open data standard established and maintained by an industry non-profit, such as Ohail, to act as a universal standard for all taxi apps.

Furthermore, in implementing the open platform approach, the government may elect to also establish its own branded app to compete on the open platform. If the government does not elect to implement its own branded app, instituting basic regulatory standards for the apps through rulemaking may be necessary to maintain market balance and the requisite safeguards. An open platform implemented by promoting and approving commercial solutions is one of the ***low*** to ***moderate*** cost options for a municipality attempting to create a centralized taxi app. The majority of costs to develop, market, and maintain the technology will rest on private companies.

However, the local government will incur some costs to oversee the process, draft necessary legislation and regulations, establish and complete approval processes, and conduct enforcement efforts. Many of the more restrictive approaches require more detailed rules and significant procurement contract costs. If the government elects to develop an app or contract to brand an already existing app, the costs will be higher, but it may reduce the need to draft as many market protection regulations. Overall, the costs involved in this approach should be ***low*** to ***moderate***, and result in expenses less than or equal to those of a single government branded app.

73 http://councilmemberriemer.com/taxi/. Additional information obtained through conversations with Montgomery County Councilmember's Staff on February 5, 2016.
74 *Id*.

The process of considering how to adapt to newly introduced TNCs began in Montgomery County in October 2014, and by July of 2015, less than a year later the County had passed legislation establishing the creation of the open platform taxi hailing protocol. The regulations are still being drafted but are expected to be completed by March or April of 2016, and there is hope they may be approved in the April/May 2016 budget period. This would put the timeline from the initial idea to the final passage of regulations at approximately one and half years. Montgomery County is also giving drivers a six (6) month window during which they must begin using one of the approved apps. Depending on local circumstances, implementation of this approach in its entirety should take approximately ***one*** to ***two*** years. Because of the availability of new technologies and an awareness of potential obstacles, the City of Montreal may be able to implement this approach in a shorter timeframe than that of Montgomery County, MD.



E. Approach: Government Regulatory Dashboard (with Competing Applications)

Another possible approach is one which implements a government branded platform that is required to connect to various competing taxi e-hail apps. Under this approach, the local government will need to hire a private company to develop and implement the technology system that will act as the platform through which each e-hail app is connected, and all e-hail requests are made. The system will be required to interface with existing dispatch systems, or on-board equipment, to provide real-time updates of taxi availability. [75]

An example of such technology is what RideIntegrity initially proposed in San Francisco, which is a cloud-based system that has been developed specifically for the purpose of providing taxi and for-hire vehicle regulators with real-time data, which can be used to: assess the supply and demand for taxicabs; monitor and facilitate the dispatch of vehicles to meet consumer demand; implement real time enforcement to alleviate geographic or other discrimination in taxicab supply; enforce taxicab operating regulations, including fare calculation if desired, in real time; enforce taxicab driver licensing, vehicle operating authorization, and other driver rules; and investigate and resolve lost and found cases and customer complaints virtually and almost instantly from a regulatory dashboard designed for this purpose.

A system with the specifications above can be used to create an electronic taxi access platform, and to provide public access to all licensed taxis through smartphone and internet applications. The electronic taxi access platform will collect GPS and other data from dispatch service permit holders and individual vehicles, and all data will be available to any app developer who enters into a use agreement with the local government.

The local government will likely also need to pass legislation mandating that all drivers and companies share data with the centralized platform, and cooperate with the implementation and installation of the platform systems.[76] The software company who wins the contract to develop the platform will use this equipment to create a single authoritative data stream that will

75 http://www.prnewswire.com/news-releases/sfmta-moves-forward-with-comprehensive-taxi-app-data-199568111.html.
50 https://www.sfmta.com/sites/default/files/notices/2015/FINAL%20SFMTA%20E-Hail%20Criteria%2012-17-15.pdf.

function as a data-gathering platform. This will essentially establish the common language through which all data can be shared by app developers, enforcement authorities, drivers, and the public requesting transportation through apps.[77]

Local governments using this approach will also likely need to pass rules requiring all dispatch service companies and/or drivers to affiliate with an approved e-hail app, and requiring all approved e-hail apps to integrate (i.e. be able to communicate and exchange data) with the electronic taxi access platform.[78] This will ensure that every licensed taxi in the jurisdiction is capable of being electronically hailed, and that all relevant data is gathered on the platform. Unlike the open platform approach, apps affiliated with a certain group of drivers or dispatch companies will not be required to e-hail taxis using other apps. The platform will provide a means of transmitting an e-hail request from any approved app to drivers using the same app, and all apps will compete to be used by both drivers and consumers. The number of apps that will integrate with the electronic taxi access platform and compete for market share as e-hail service providers will largely depend on local market variables.

While this approach requires that all approved apps need to communicate with the electronic taxi access platform, no single approved app is required to be able to e-hail taxis affiliated with other apps. Conversely, there is no rule which limits the number of apps a driver or company can affiliate with, nor which prevents one or more apps from affiliating with all licensed taxis. This approach uses a government branded platform to ensure that every licensed taxi has integrated with e-hail capable technology, but it is ultimately up to one or more private apps to affiliate with all licensed taxis before any one app is truly able to e-hail the nearest available taxi.[79] In theory, an app would be allowed to affiliate with every licensed taxi, and would therefore have the capability to dispatch the nearest taxicab upon any dispatch request.

The government platform will allow real-time information to be easily gathered, shared, and analyzed, which will drive innovation to improve the taxi industry and ensure that it can

77 http://www.sfgate.com/bayarea/article/SF-universal-taxi-app-data-sharing-plan-4371404.php.
78 https://www.sfmta.com/sites/default/files/notices/2015/FINAL%20SFMTA%20E-Hail%20Criteria%2012-17-15.pdf.
79 *Id.*

grow with advancing technology.[80] Under this approach, all taxis would be required to affiliate with an e-hail application that is integrated with the government platform, ensuring that all taxis have electronic hail capabilities.[81] Nothing in the approach limits the number of apps a driver or company can affiliate with, nor prevents one or more apps from affiliating with all taxis. An app affiliated with all taxis would be able to dispatch the nearest available taxi using the government platform.

Apps featuring new features and technologies could also be easily approved to integrate with the government platform, and consumers will not be stuck with one or two subpar apps. The government would not need to invest to improve or develop technology as private sector competition among app developers will drive new innovations. App users would be able to choose among a variety of apps with various improving features, but would always be sent a licensed and regulated taxi. In using this approach, no single approved e-hail app is required to be able to e-hail taxis affiliated with other apps.[82] This means that no e-hail app may be capable of requesting a pick-up from the nearest available licensed taxi. If no app affiliates with all taxis, then it limits the taxi industry's ability to compete against TNCs as a whole. In order to meet supply standards, only apps which are able to contract with a large amount of taxis may be granted approval to integrate with the platform and provide e-hail service. While this approach increases competition among apps, infighting may undercut the taxi industry's ability to work together to improve the industry in the face of new market competitors. This approach may also be very costly and require constant attention in the form of updating the platform to include new innovations, monitoring and enforcement efforts, and the drafting/amending of new regulations.

In order to implement the government branded platform, a procurement process will likely need to take place in order to contract with a technology provider to develop the platform. This is usually done through an RFI or RFP process through which the local government can select a technology provider to build or install the platform.

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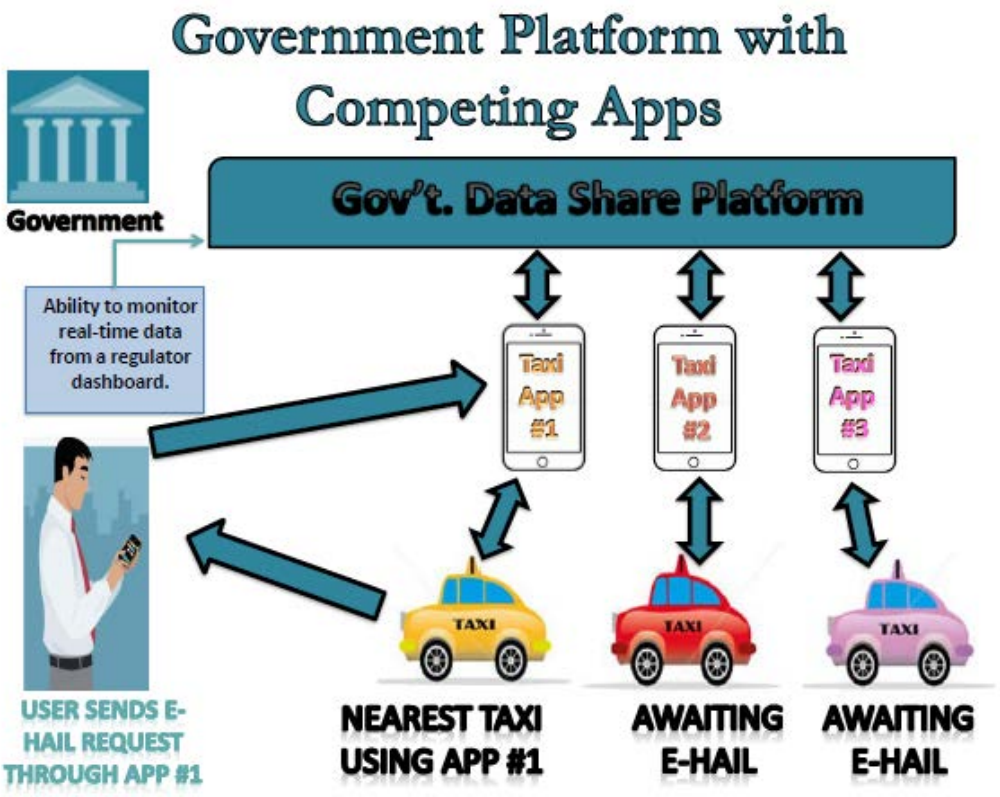
80 http://www.prnewswire.com/news-releases/sfmta-moves-forward-with-comprehensive-taxi-app-data-199568111.html.
81 https://www.sfmta.com/sites/default/files/notices/2015/FINAL%20SFMTA%20E-Hail%20Criteria%2012-17-15.pdf.
82 https://www.sfmta.com/sites/default/files/notices/2015/FINAL%20SFMTA%20E-Hail%20Criteria%2012-17-15.pdf.

This approach is likely most effective when coupled with regulations which mandate that all taxis affiliate in some way with an approved platform integrated e-hail app.[83] This ensures that all taxis are capable of receiving e-hail requests through at least one app. The government may also want to consider implementing regulations that set criteria and performance standards for taxi apps seeking government approval to integrate with the platform. Examples include accessibility requirements, response time standards, mandatory customer service features such as grievance procedures, and various other functionality requirements.

In comparison to other approaches, the cost to implement a government branded platform and regulate competing apps is ***moderate***. This approach will require a government procurement process and contract with a private company to develop or implement the platform technology. It will also require regulations to mandate implementation of the technology, integration with the platform, and use of an approved app among all taxis. Other regulations will likely be required in order to maintain market balance and equitable service such as accessibility rules, and supply standards. The government branded platform will also require maintenance and continuous improvement in order to keep pace with industry innovations. There will also be costs to review the data for market improvement and enforcement efforts.

San Francisco faced many challenges implementing this approach, and the end result is slightly different than the original goal. However, with advancements in technology and the ability to observe and avoid the obstacles faced in other jurisdictions, other localities may be able to implement this approach in a significantly shorter period of time. A government branded platform with competing apps approach could reasonably be implemented in a period of ***one*** to ***three*** years.[84]

83 https://www.sfmta.com/sites/default/files/notices/2015/FINAL%20SFMTA%20E-Hail%20Criteria%2012-17-15.pdf.
84 http://www.prnewswire.com/news-releases/sfmta-moves-forward-with-comprehensive-taxi-app-data-199568111.html.
https://www.sfmta.com/sites/default/files/notices/2015/FINAL%20SFMTA%20E-Hail%20Criteria%2012-17-15.pdf.



F. Approach: Private Sector Solutions

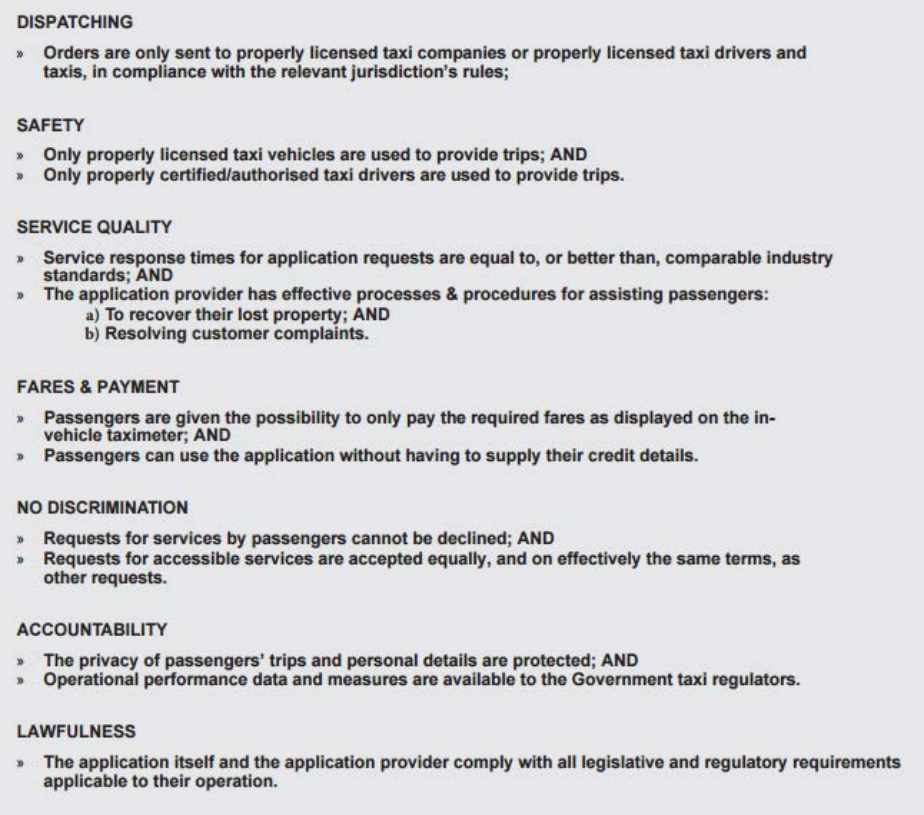
Under the Private Sector Solutions approach, the government does not implement a model, but instead allows for the private sector to develop independent market innovations. Several innovations have been introduced in cities around the world. One possible solution is for a private sector app to enter the market and successfully reach all the taxis available in the city. A single private sector app can be even more efficacious if it is already successful in other cities. In an increasingly more mobile world, consumers appreciate an app that works across different geographical locations. For example, the City of Vancouver's taxi companies came together to work with an app called eCab, independently from the city's government. eCab is a product of the International Taxi Alliance and is currently available in 6 countries and 30 cities with plans of increasing to 9 countries and 50 cities in the near future.[85]

85 https://www.e-cab.com/en/.

Another possible private sector solution that might come to fruition is an Aggregator model. An aggregator app would list all possible for hire vehicle options such as different taxi, black car, and limousine companies with a price comparison for each route. Karhoo, is an example of an aggregator app that has recently launched in London and plans to launch in New York City, Singapore, and across the globe soon.

Another private sector solution would be to join UpTop, the Global Taxi Network (the "Network"), which was created by the International Road Transport Union ("IRU"). UpTop encourages companies with apps to apply to become a certified partner in the Network.

One of the main pillars of the Network is to encourage commercial agreements between the apps to allow for cross-dispatching. For example a customer using a partnered taxi app in New York, can use the same app to e-hail a taxicab anywhere in the world where a Network partner is operating. Successful applicants must meet the following criteria:



DISPATCHING

» Orders are only sent to properly licensed taxi companies or properly licensed taxi drivers and taxis, in compliance with the relevant jurisdiction's rules;

SAFETY

» Only properly licensed taxi vehicles are used to provide trips; AND
» Only properly certified/authorised taxi drivers are used to provide trips.

SERVICE QUALITY

» Service response times for application requests are equal to, or better than, comparable industry standards; AND
» The application provider has effective processes & procedures for assisting passengers:
  a) To recover their lost property; AND
  b) Resolving customer complaints.

FARES & PAYMENT

» Passengers are given the possibility to only pay the required fares as displayed on the in-vehicle taximeter; AND
» Passengers can use the application without having to supply their credit details.

NO DISCRIMINATION

» Requests for services by passengers cannot be declined; AND
» Requests for accessible services are accepted equally, and on effectively the same terms, as other requests.

ACCOUNTABILITY

» The privacy of passengers' trips and personal details are protected; AND
» Operational performance data and measures are available to the Government taxi regulators.

LAWFULNESS

» The application itself and the application provider comply with all legislative and regulatory requirements applicable to their operation.

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UpTop currently has 450,000 taxis (almost 10% of the world taxi fleet), and its goal is to reach one million taxis by the end of 2016, on all continents (20% of the world taxi fleet), in order to have a real impact on the entire taxi industry and improve terms of quality of service worldwide. UpTop's vision is guided by a high-level advisory committee on matters related to its functioning, taxi service quality, regulations and fair competition. The UpTop Advisory Committee is composed of leading international public and private stakeholders, and is chaired by the International Transport Forum ("ITF"), an intergovernmental body representing the Transport Ministries of 57 countries.

The two founding UpTop partners, taxi.eu and eCab (mentioned above), established a cooperation agreement when the Network was created in November, 2014. Customers of either of the respective apps can use their smartphone application to book a taxi both in Berlin and in Paris. Other partners have followed this example as well, resulting in the creation of a number of roaming areas within the Network. The IRU facilitates the process without intervening in the

86 http://uptop.taxi/wp-content/uploads/2016/03/UpTop-Service-Quality-Conditions.pdf

commercial agreements. One of the latest partners to join UpTop is The Ride, an extremely interesting app that provides a direct link to taxis and public transport across Canada. Dispatch companies with apps in Montreal can apply to join the UpTop Global Taxi Network, and create commercial agreements with other Network partners to increase their customer base. As the Network continues to grow, all the partners within the network grow together.

The advantage of permitting the private sector to create solutions independently allows for freer innovation which could lead to more creative and original ideas, than a rigid government solution. Another benefit is a lesser burden on the government to get involved. On the other hand, with decreased government involvement there is less room for the government to set standards, retain oversight or guarantee a desired outcome. Taxi companies might not feel motivated enough to come together, or be able to create the proper environment to implement a solution without the help of an outside party such as the government. Even if they are capable of working together and reaching a successful outcome independently, there is no indicator of how long it would take to do so. If a speedy outcome is desired then this approach might be the best or worst option. Without government intervention, there is less red tape for the private sector to overcome, eliminating the time spent waiting for the City to approve a program and then to take the necessary steps to implement it. Conversely, without the government vehemently guiding the process through a set timeline, it could possibly take more time to implement.

For this approach, the government can either leave the private sector to implement completely on their own, or provide certain incentives to boost the desired outcome more hastily. The government could give discounts on licensing fees or tax incentives to companies or drivers that adopt an e-hail app. The government could also enter into public-private partnerships as an incentive for creative solutions. Additionally, the government can choose to host a technology summit bringing together stakeholders and innovators to nurture an innovative environment.

The cost for this option can be absolutely nothing if the government chooses to leave the private sector completely on their own. If the government chooses to provide incentives, the cost would need to be calculated accordingly.

Private Sector Solutions

No Government Role except providing incentives.

All for hire vehicles including taxis and limousines are accessible through one app showing a price comparison of each mode.

All taxis come together under one industry app. Can either be a locally developed app or an internationally successful app.

V. Recommendation for Montreal

After a comprehensive review of the different approaches discussed above and feedback from the Technological Innovation Committee[87], it is our recommendation that the best approach for the City of Montreal is to adopt an open shared platform with a single government application (allowing competitive commercial applications to operate in the City as well). We recommend the City issue an open ended Call for Tender ("CFT") that requests respondents to develop an innovative business model which provides the City with a single government branded application and an open shared platform. All taxi drivers should be mandated to download and be logged onto the government branded app while providing for-hire vehicle services in the City, though drivers would not be prohibited from using other commercial taxi apps simultaneously. The CFT should require that the government branded app allow for voluntary loading of payment options, meaning that a driver can select whether they wish to accept credit and/or cash payments.[88] The app would notify customers which payment options are available in the nearest taxis, and customers would have the option of being connected with a driver based on their needs or preference.

The City's CFT should describe that the platform's initial purpose is to collect data, but over time, the platform would have the ability to allow for API sharing with competing commercial apps to connect to the platform to allow for cross-dispatching, as defined earlier in this Study. Successful CFT responses will provide a comprehensive business model that has a no cost or minimal cost to the government, proposing alternative revenue generation strategies for the creation, management, maintenance, and marketing of the app and platform. Examples of creative revenue streams could include, but not be limited to, a public-private partnership of the app, in-app advertising, or data collection and mining for an approved usage. Additionally, respondents should be weighted and scored according to how quickly their business model can be implemented, and at the lowest possible cost to not only the government but to the public and

87 A presentation of sections of this Study was presented at the Innovation Committee meeting on March 9th, 2016, at which members of the committee provided their feedback to inform the final version of the study.
88 This could be a temporary solution as the goal is ultimately for all drivers to eventually offer the credit card option.

the drivers. The government will need to subsequently create new rules or regulations to enforce the usage of the app, including back-end dispatch system and meter integration, and/or independent apps being required to share their APIs.

An open shared platform, with a government branded app, is the best solution for the City of Montreal. Not only does it incorporate the most efficient and innovative technology to date, but this option also addresses the unique needs of the market – one in which 25 percent of taxicabs are not affiliated with a dispatch company. Mandating a government application provides *all* drivers with e-hail access and capabilities, including the 25 percent that may or may not have their own applications. The requirement that all drivers must be logged onto the government app, while providing for-hire service, also guarantees that the maximum supply of taxicabs is available to customers at any given time, resulting in the lowest possible wait times when searching for a ride. For transportation services, like Uber or taxis, speed is dependent on the number of cars on the road. The more cars that are available, the sooner – on average – a car is able to pick up a customer.

Passenger satisfaction with the taxi service in the City of Montreal has an obvious impact on ridership, as well as an impact on the overall health of the industry. The challenge facing taxis is that when apps are fragmented by fleets, the customer will not get the same level of service as the fleets could provide if they were all combined on one app. A universal application for all taxicabs would help solve the fragmentation problem throughout the City. In addition, the provision for voluntary pre-loading of payment options in the government app allows drivers and customers alike for their choice of payment method, as not all drivers or customers prefer electronic payment.

Furthermore, the open shared platform provides the government with a valuable tool for data collection, to allow for monitoring the industry for accountability and safety concerns. The platform could collect real-time data, with which the City can: assess the supply and demand for taxicabs; monitor and facilitate dispatch of vehicles to meet consumer demand; implement real time enforcement to alleviate geographic or other discrimination in taxicab supply; enforce taxicab operating parameters, including fare calculation if desired, in real time; enforce taxicab driver licensing, vehicle operating authorization, and other driver rules; and investigate and resolve lost and found cases and customer complaints virtually from a regulator dashboard

designed for that purpose. It also allows for quantifiable analysis that is crucial for future policy making. In addition, the open shared platform model allows for commercial taxi apps to operate freely and compete in the market based on their merit. Ideally, all applications, government and commercial apps, will eventually be capable of connecting to the shared platform, resulting in cross-dispatching capability, allowing customers access to the City's entire transportation fleet.

Lastly, the CFT process will produce competitive bidders to present the most cost effective solutions. This will yield a solution that is of zero to minimal cost to the government, and is the lowest cost option to customers for a competitive value as a service to the public, while maximizing profit for the drivers and generating income for the successful applicant.

This recommendation is agnostic as to the particular solutions chosen in each other jurisdiction to date. While the recommended course of action for Montreal is based upon the combination of a number of various ideas explored or methods employed so far by other regulators, no approach is *per se a* universal best practice. Each jurisdiction has its own unique characteristics, evolutionary stage in terms of technology and various political, socio-economic, legal and other dynamics that do not call for a "one-size-fits-all" approach to the regulation or implementation of a "universal taxi application" solution. The various regulatory agencies and private entities that have and are engaging in cutting-edge regulatory innovation, and the exploring new ideas, should be encouraged, tracked and monitored. It is too early to identify best or accepted regulatory practices, as universal taxi apps are still in their nascent stage. The approach chosen for Montreal does not, in any way, support or favor any other jurisdictions, or result in any tacit or overt opinion that the approaches of other cities are not appropriate. Montreal is benefitting from its own exchange of ideas, regulatory actions and leadership, as well as those of other regulatory agencies identified in this report.