OPEN MOBILITY FOUNDATION

CURB TECHNOLOGY GUIDANCE

PLAYBOOK

LEARN ABOUT:

Innovations in curb technology are transforming the opportunities for cities to better understand and manage their curb assets. Learn the right questions to ask about capabilities; data ownership and transfer; and long term scalability and interoperability of various technology solutions.

This document serves as a guide to help cities design and procure the right technology for their curb project.

THE SMART CURB COLLABORATIVE

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The SMART Grant Collaborative is an initiative of the Open Mobility Foundation (OMF). Membership in the collaborative is a key aspect of the USDOT SMART Grants awarded to each of the member cities . While each city's project is unique, all projects share a similar problem and technological approach, specifically to digitally gather and analyze curb information to reduce congestion, enhance livability, provide the tools to address equity, and improve safety on city streets. The shared, open-source Curb Data Specification (CDS) stewarded by the non-profit OMF lies at the heart of this collaboration, and will enable data to be gathered and analyzed such that cities can more optimally use their curbs and dynamically respond to emerging policy needs through experimentation, piloting and prototyping various approaches.

MEMBERS

THE SMART CURB COLLABORATIVE

INTRODUCTION

Innovations in curb technology are transforming the opportunities for cities to better understand and manage their curb assets. Technology to support improved understanding and management of city curbs is not new, with early deployments starting in 2019, but the technology is continually improving and there are more case studies and lessons learned with pilots and new deployments across the country. As with all new technology, it is helpful to probe and ask clarifying questions to ensure that all parties have clear expectations around capabilities, data ownership and transfer and long term scalability and interoperability. This document serves as a guide to help cities consider questions from a variety of angles to help them design and procure the right technology vendor to meet their needs.

PURPOSE OF DOCUMENT

- Provide an overview of curb technology solutions
- Provide guidance to city staff on the right questions to ask curb technology vendors and how to approach procurement
- Suggest terms and conditions to include in contracts with curb technology vendors
- Empower city staff to hold vendors accountable for data validation and improvements during a pilot

OVERVIEW: CURB TECHNOLOGY SOLUTIONS

Curb management technology isn't a new phenomenon but has evolved in recent years to provide more and more offerings way beyond traditional parking payment. These technologies can now provide a range of sensing technology that can support a wider variety of use cases from enforcement to occupancy and even reservations. The following is a list of categories of curb technology solutions that cover a range of technology components and systems from lidar, to cameras, to magnets, to light detection.

The curb technology space is rapidly evolving and as such, this resource provides a limited snapshot of the vendors and technology available at the time of writing. If you'd like to suggest changes or additions to any future versions of this guide, please get in touch!

DATA COLLECTION SYSTEMS

INCLUDING INFRASTRUCTURE MAPPING

Technology or asset management systems that support the collection of curb inventory to create a digital database of curb regulations and/or assets. This is a foundational step that is often a requisite to successful deployment of any of the subsequent curb technology solutions.

For example: CurbIQ, INRIX, Modii, Populus, Umojo, Blue Systems, Cleverciti

PAYMENT FOR PARKING

Systems that allow users to pay for curbside parking; either by physical pay station or mobile payment

For example: IPS, Pay by Phone, Passport, Parkmobile

CURB PARKING MONITORING

MAY INCLUDE REAL-TIME OCCUPANCY

Technology that is able to capture the use of the curb (occupancy primarily but to differing degrees vehicle class, type, etc). This can be through modeling and predictive analytics, GPS and telematics, or physical monitoring of the curb space through computer vision cameras or in ground sensors)

For example: Umojo, Cleverciti, Eleven-X, Numina, Automotus, Modii

RESERVATION FOR PARKING OR LOADING

Technology that allows users (primarily geared towards commercial users) to reserve curbside parking or loading. Still very nascent.

For example: Automotus, Skidata, Coding the Curbs

PRICING AND POLICY

Systems that are able to create public-facing feeds representing existing curb policies and/or other transportation policies.

For example: Vendors that output CDS or MDS policy feeds via public API, such as: CurbIQ, INRIX, Eleven-X, Modii, Populus, Umojo, Blue Systems

DIGITAL PERMITTING

Systems that allow for a digital connection between vehicle and access to curb or roads.

For example: Passport. Vendors that support permitting tied to license plate registration; could take many forms

AUTOMATED ENFORCEMENT

Technology with the ability to detect unique vehicles and compliance with existing regulation without manual intervention.

For example: HaydenAI, Cleverciti, Automotus. Vendors that provide enforcement of red lights, bus lanes or school zones, curb enforcement: still very nascent.

OUTREACH AND COMMUNICATION

Technology or systems that help to communicate existing rules, regulations, and/or updates.Use cases can be wayfinding and navigation to available parking to reduce cruising, identifying EV chargers, etc.

For example: Skidata, Cleverciti, Umojo. Vendors that support digital, dynamic curb message boards/signage

MEMBERS

The following vendors are [members of the Open Mobility Foundation] and offer products and services related to Curb Management Technology:

APPYWAY	**BLUE SYSTEMS**	**CLEVERCITI**
CURBIQ	**ELEVEN-X**	**INRIX**
MODII	**PASSPORT**	**TURNSTONE**
	UMOJO	

CONSIDERATIONS

ALIGNING TECHNOLOGY WITH CITY GOALS AND PRIORITIES

Before initiating a curb technology program, there are several areas to consider in preparation:

INTERNAL OPERATIONAL READINESS

The capacity to review findings/data analysis, manage the vendor, have a dedicated champion at the PM level, obtain internal buy in, support around marketing/ communications to communicate with the public

LEGAL READINESS

Confirmation that the City has the ability to deploy and enforce the technology? (i.e., Municipal codes related to automated enforcement, LPR, sworn officer enforcement, ticket by mail)

DATA READINESS

Policies related to data storage/retention, privacy, management, and ownership

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To ensure that technology is used strategically and to maximum impact- we recommend that cities always start by defining key problems, mapping out users, and identifying existing and future use cases. The questions below are meant to help cities frame how they both determine IF new technology is needed and HOW any technology will be deployed to solve problems for specific users.

UNDERSTAND YOUR PROBLEM

Have a clear understanding of the problem you hope to solve with technology and the objective of the technology solution.

FUNCTIONS

What will the technology allow you to do/monitor/understand and how will this technology help the city and/or users improve outcomes? For example, a city who desires to increase compliance with loading zone regulations may require different technology solutions than a city who wishes to display available parking for residents and visitors, or a city who wishes to increase the occupancy of off-street parking garages and lots.

DATA ACCURACY

Will the proposed solution provide an adequate level of data accuracy and granularity to achieve your policy goals? (e.g. Is 90% accuracy enough for automated enforcement?)

CONSIDER IMPACT

Have an outreach plan to understand the impact of technology on users of the technology, and consider:

- Who would use or interact with the technology (e.g. City staff vs. general public vs. commercial delivery)?

- How might this technology impact current state behaviors? E.g. Do users need to change behaviors or actions based on this new technology? Passive or active engagement with the technology? Etc?

- What will be the city's responsibility vs. the vendor's responsibility?

UNDERSTAND YOUR DATA REQUIREMENTS

Before you procure, ensure you have a solid understanding of what data is "must have" vs. "nice to have" from the technology provider. Provide as much information and detail as possible to vendors so they have a clear understanding of your goals and priorities.

TECHNOLOGY CAPABILITIES

Consider asking the following questions of prospective vendors during the vetting and selection process:

- What are the requirements for operating and the base capabilities of the company's technology? This might include details like installation, permitting, and power needs, impacts of darkness and weather on the technology, and product features that already exist ("off the shelf"). What level of construction work is the City willing or able to take on?

- Require the vendor to prove those capabilities, either through a demonstration or through references from other cities in which the company has launched its service.

- Has the technology been piloted or scaled in any other cities? If so, provide contact information and any pilot evaluations/reports.

- Assess risk of company business. Start-ups are inherently riskier than historical vendors. Hardware vendors pose a greater financial risk than a software vendor if a vendor goes out of business. Ensuring that cities own data generated by either hardware or via subscription can help to mitigate this risk.

- Has the vendor provided a data dictionary or specification sheet with details on how data fields will be observed or determined?

- Do you have a clear understanding of how the data is generated and processed (e.g. what machine learning algorithms are used/assumptions made/k-values/etc) to create the desired outputs? All data requires some level of processing.

- Do you have a clear understanding of the issues that might impact data quality on a daily/yearly basis? E.g. Hardware malfunction due to street cleaning/weather/road maintenance? Data degradation/loss of data accuracy due to low light/night time/weather?

- Do you have a clear understanding of the hardware needs with respect to zoning or permitting, power needs, fiber needs, clearance requirements, mounting needs, etc? Are you able to anticipate challenges before procurement is complete?

- Similarly, do you have a clear understanding of the needs on the public sector side to maximize the use of the technology?Eg. Staff capacity and skills, integration with existing tools and systems, and/or clear understanding of the primary format (e.g. dashboard) that data will be presented back to the city.

CONTRACTING AND MAINTENANCE TRANSPARENCY

Use these guidelines and considerations when engaging in contracts with vendors.

- During piloting phases, avoid long-term contracts that limit future flexibility. Discuss with vendor the potential for month-to-month contract terms.

- Ensure clear level of service terms – the vendor contract should define performance metrics, uptime, and support levels. Vendors are often open to using city service agreements and contracting forms so feel free to share those even if the vendor has their own form.

- Understand total costs – be cautious of hidden costs for hardware, maintenance, or data storage. Ask questions about maintenance service levels and how they will be serviced (local support or non-local)? Understand how subscriptions will operate and how renewals may work

- What is the company's data privacy policy? Are they willing to comply with the City's pre-determined policies?

DATA COLLECTION, TRAINING, VALIDATION, AND OWNERSHIP

All sensors (including camera technology) must be trained in the unique operating environment and to ensure that the city objectives, metrics and data are correct. Training is different from validation.

Consider asking potential vendors:

- How does the company ensure the quality/accuracy of their data?

- If they share data in "real time", what is the refresh rate?

- In what format can they share the data with the city (Curb Data Specification, platform, etc.)? Will this data be allowed to be shared publicly via an Open Data Portal? Who actually "owns" the data?

- How will your technology provider share or collaborate with existing or future technology providers? Eg. How much work/effort will there be to coordinate between different vendors and systems (current or future) such as between different hardware providers, existing or legacy systems asset management or parking payment technology, etc?

VALIDATION, FEEDBACK, AND DETERMINING SUCCESS

Validation takes place by comparing ground truth data (usually collected manually or by manually inspecting videos) with the sensor output, and providing a metric of performance. Consider:

- Does the technology meet your objectives?

- Have you done a separate validation on the technology? Eg. Using a different vendor, typically a traditional curb study vendor, or a manual field inspection to perform an assessment of data quality?

RED FLAGS TO WATCH OUT FOR

PROPRIETARY SYSTEMS OR LACK OF LONG TERM OWNERSHIP OF DATA ASSETS

Vendors sometimes look to lock customers into their proprietary hardware or software solutions, making it difficult to switch vendors or share with other vendors (e.g. sensor company needing to share with a data integrator.

MISLEADING METRICS OR CASE STUDIES

Vendors, especially in start-up stages, need to sell their product and sometime over inflate their success in other cities. It's important to also compare and contrast the example cities with your own, as a city that is vastly different may not apply to your city's unique context and needs.

Also, understand that past experience is not indicative of future experience. For example, if a sensor company has predominantly provided sensors for parking garages and off-street parking, that experience may not translate as well to the complexity of on-street parking. It might, but needs to be considered upfront.

UNWILLINGNESS TO DEMONSTRATE A MINIMUM VIABLE PRODUCT

Vendors who are unwilling to test on a (very) small scale before full deployment or vendors that sell a future product that is not actually built or available in the timeframe you need.

POOR REFERENCES

If the company can't provide any positive references from other cities, that might be a red flag and/or your city needs to ask whether they're willing to be the first to test with this vendor.

REALITIES TO CONSIDER

Despite the red flags listed above, many technology companies in the curb management space are new and still refining their technologies. Cities, like those in the SMART Collaborative, are imperative to ensuring technology that can support curb management and city goals have a chance to miss the mark, improve, and eventually succeed.

Pilots require a level of risk and knowledge that the project might not "work". This resource is not intended to dissuade cities from innovative pilots, nor to be overly rigid in the vetting and contracting terms with emerging technology vendors.

This resource is intended to offer guidance to ensure that a technology is ready to pilot, that the vendor isn't overpromising and is willing to be collaborative and make improvements during the pilot project, and that the city is making a smart partnership and investment that will generate learnings, even if the project doesn't scale.

THANK YOU

A special thanks to the members of the Open Mobility Foundation's SMART Curb Collaborative for contributing their time, experience, and dedication to this effort. This project seeks to share learnings and resources for any city or agency to adopt.

This paper was authored by the Urban Freight Lab with help from CityFi in collaboration with the Open Mobility Foundation.

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