Smart Mobility Hubs
Concept of Operations &
System Requirements
MANDY BISHOP  
Program Manager,  
City of Columbus  
mkbishop@columbus.gov

JEFF KUPKO  
Michael Baker International  
Project Manager,  
City of Columbus  
jeffrey.kupko@mbakerintl.com

MATT GRAF  
Technical Lead,  
HNTB  
mgraf@hntb.com

DOUG ARSENEAULT  
Public Affairs Administrator,  
COTA  
arseneaultdc@cota.com
TODAY’S AGENDA

01 | PURPOSE OF THIS WEBINAR
   • Share concept development activities from Smart Columbus with stakeholders

02 | WEBINAR CONTENT
   • Smart City Challenge Overview
   • Smart Columbus Program Overview
   • Smart Mobility Hubs Project Overview
   • Smart Columbus Smart Mobility Hubs Project Concept of Operations
   • Questions
   • Smart Columbus Smart Mobility Hubs System Requirements
   • Subject Matter Experts Panel
   • Questions
   • How to Stay Connected

03 | WEBINAR PROTOCOL
   • All participant lines have been muted during the webinar in order to reduce background noise
   • Questions are welcome via chatbox during the Q&A Section
   • The webinar recording and presentation materials will be posted on the Smart Columbus website
$40 MILLION
78 APPLIED • COLUMBUS WON

SMART CITY CHALLENGE

THE CITY OF COLUMBUS
ANDREW J. GINTHER, MAYOR

U.S. Department of Transportation
SMART COLUMBUS OVERVIEW
VISION

To empower our residents to live their best lives through responsive, innovative and safe mobility solutions.
To demonstrate how an intelligent transportation system and equitable access to transportation can have positive impacts on every day challenges faced by cities.
OUTCOMES

SAFETY  MOBILITY  OPPORTUNITY  ENVIRONMENT  AGENCY EFFICIENCY  CUSTOMER SATISFACTION
PROJECT PHASES AND TIMELINE

WHERE WE ARE GOING

- **SYSTEMS ENGINEERING**
  - AUGUST 2016

- **DEVELOP AND PROCURE**
  - AUGUST 2018

- **DEPLOY, OPERATE AND MAINTAIN**
  - APRIL 2019

- **DATA COLLECTION/ANALYSIS**
  - SEPTEMBER 2019

- **SOLICIT/VALIDATE USER NEEDS | ENGAGE STAKEHOLDERS/PUBLIC | COMMUNICATE PROGRESS/PARTICIPATION OPPORTUNITIES**
  - JUNE 2020

- **SUSTAIN**
  - MARCH 2021
OPERATING SYSTEM DETAILS

Data Environment
- Data ingestion
- Streaming data
- Data tagging
- Data aggregation

Security
- Data encrypted in transit & at rest
- ID Access Management (IDAM)

Scalable Capacity
- Built with open source/open architecture
- Elasticity with AWS Cloud Services
- Microservices

Data Lake
- Fast and slow storage capacity
- Only store what we must; leave data at native source (for security & storage mgmt.)

Data Research Environment
- Social community
- Data discovery
- Visualization
- User dashboards

Shared Services
- Application hosting
- Function sharing through microservices (real-time ML, route optimizer)

Analytics
- Core analysis tools
- Machine learning
- Artificial intelligence
• Fixed route bus service
• Transit System Redesign
• Park-and-ride and transit facilities
• CMAX Bus Rapid Transit
• Public 4G Wi-Fi provided at transit centers and on buses
Gaps in service provided by the current system include:

- Limited FMLM transportation options available at transit facilities
- Lack of centralized FMLM transfer zones
- Lack of amenities offering trip planning and seamless transfer to multimodal transportation options
- Trips are not being optimized for ride-sharing, including microtransit
- Unbanked users and users without smart phones are excluded from FMLM travel options
- Limited safety features at transit facilities
GEOGRAPHIC FOCUS OF HUBS
• St Stephen’s Community House
• Columbus State Community College
• Linden Metro Library
• Central Ohio Transit Authority (COTA)
WHAT ‘MAAS’ MEANS FOR COLUMBUS
• Lower density
• Job centers disconnected from residential neighborhoods
• Infrastructure prioritizes cars over people
• High single occupancy vehicle usage
• Low transit usage
• Lack of trust, familiarity with mobility options
• Public perception of excessive trip time and service uncertainty
As the public transit system, COTA is an integral partner in forging successful outcomes in Smart Columbus projects including:

- Multimodal Trip Planning App/Common Payment System
- Smart Mobility Hubs
- Mobility Assistance for People with Cognitive Disabilities

Committed to using our expertise and resources as an:

- Advisor
- Partner
- Solutions Provider
MOBILITY AS A SERVICE

- The future of transit is multimodal and on-demand
- A shift away from personally-owned vehicles
- A solution that uses both public and private entities
- Integration with the Smart Columbus Operating System
DEPLOYMENT CONCEPT OVERVIEW
• The purpose of the SMH project:
  • Deploy transportation facilities that provide travelers with consolidated transportation amenities
    • Interactive kiosks
    • Real-time transportation information
    • Comprehensive trip-planning tools (via MMTPA/CPS)
  • Designed to accommodate multiple modes of transportation from a single location
    • Bike-share
    • Car-share
    • Scooter-share
    • Other mobility providers
CONCEPTUAL INTERFACE

System of Interest
- Hub Service
  - Wi-Fi
  - Kiosk
  - Emergency Call Button
- Hub Mobility
  - Electric Vehicle Charging
  - Bike Rack
  - Bike Share
  - Park and Ride
  - Real Time Data
  - Mobility Provider
  - COTA Bus Service
  - USB Charging
  - Designated Pickup/Drop Off Zones

Operating System
- MMTPA
- IVR
- Trip Optimization
- CPS
- Payment

Traveler

City of Columbus
- Emergency Dispatch Center

COTA
- Third Party Users
SOLUTION

- Kiosk
  - Emergency Call Button
  - USB Charging
  - Free Wi-Fi

- Realtime displays

- Mobility providers
# SOLUTION

<table>
<thead>
<tr>
<th>Location</th>
<th>Park and Ride</th>
<th>Wi-Fi-Enabled</th>
<th>Car-Sharing</th>
<th>Docked Bike-Sharing</th>
<th>Ride-Sharing</th>
<th>Real-Time Displays</th>
<th>Bike Racks</th>
<th>Interactive Kiosk</th>
<th>Comprehensive Trip Planning</th>
<th>Emergency Call Button</th>
<th>USB Charging</th>
<th>EV Charging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbus State Community College</td>
<td>O</td>
<td>O</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>❌</td>
<td>O</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>✓</td>
</tr>
<tr>
<td>Linden Transit Center</td>
<td>✓</td>
<td>✓</td>
<td>O</td>
<td>O</td>
<td>✓</td>
<td>✓</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Northern Lights Park &amp; Ride</td>
<td>✓</td>
<td>✓</td>
<td>O</td>
<td>O</td>
<td>✓</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>✓</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>St. Stephen’s Community House</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>✓</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Metro Library – Linden Branch</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>✓</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Easton Transit Center</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
SOLUTION
Northern Lights
Park & Ride
SOLUTION
St Stephen’s Community House
STAKEHOLDER ENGAGEMENT SUMMARY
WHO WE TALKED TO

• Primary users of the system
  • Linden area residents and community leaders
• Employment, education, and institutional centers
• Site stakeholders
  • COTA
  • St Stephens
  • CSCC
  • Metro Library
• Vendors and service providers
HOW WE ENGAGED

• Community Working Group and open house sessions – Jan 2017
• Community Planning Event and public outreach – Feb 2017
• Public survey – Dec 2017
• Ongoing interviews with service providers
• Reoccurring stakeholder meetings
WHAT WE LEARNED

• Survey responses guided the selection of mobility hub sites

• Mobility hubs should include
  • Amenities for pedestrians
  • Park and Ride options
  • Access to COTA service
LESSONS LEARNED

• Ownership Matters

• Be Flexible

• Stakeholder Engagement Is Crucial
Public comment period open for the SMART MOBILITY HUBS Concept of Operations:

• October 17th to October 31st

• Where to find it:
  • View the ConOps at: https://smart.columbus.gov/projects
    • Click SMART MOBILITY HUBS
    • Direct link to file: http://bit.ly/SMHConOps

• How to comment:
  • Please email comments to: kldepenhart@columbus.gov
    • Subject line: Smart Mobility Hubs Comments
      • Include your contact information
    • State whether or not you represent a vendor interest
QUESTIONS?
SYSTEM REQUIREMENTS
Development Process

• Break down system into functional group categories.

• Develop technical requirements for system components.

• Link requirements with user needs, constraints, and interfaces as described by the ConOps.
Step 1
Break down system into functional group categories.

**Functional Group**
- Comprehensive Trip Planning
- Emergency Call Button
- Dockless Device Zone
- Interactive Kiosk
- Park and Ride
- Bike Racks
- Bike-sharing
- Car-sharing
- Ride-sharing
- USB Charging
- Wi-Fi Enabled
### Requirement Description (Interactive Kiosk)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Verification Method</td>
<td>Inspection</td>
<td>Demonstration</td>
<td>Test</td>
<td>Analyze</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Where source data is not available in real-time, the touchscreen shall utilize PDF and/or service board websites in the short term such as transit route maps, location specific services or tourism information, etc.

- The standby screen may incorporate a demonstration of the use of the screen, general information, and/or animation.

- **The touch screen shall display a static or animated screen or series of screens when the kiosk is not in use (as determined by a preset standby period of inactivity).**

- Users shall exit standby mode by touching the screen or activating any other kiosk controls. When standby mode is exited, the system shall display an initial start page with links to various sub-menus and content pages that allow the user to reach all information contained within the system.

- The kiosk shall provide a secured, direct-connect interface to facilities for operational administration through a wireless network interface card (NIC) or a local fiber resource.

### Step 2

**Develop technical requirements for system components.**
SYSTEM REQUIREMENTS

Step 3
Link requirements with user needs, constraints, and interfaces as described by the ConOps.

<table>
<thead>
<tr>
<th>User Need</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUBS-UN001-v01</td>
<td>Data Collection</td>
</tr>
<tr>
<td>HUBS-UN002-v01</td>
<td>Maintenance and Operations</td>
</tr>
<tr>
<td>HUBS-UN003-v01</td>
<td>User Interface Device</td>
</tr>
<tr>
<td>HUBS-UN004-v01</td>
<td>Public Wi-Fi</td>
</tr>
<tr>
<td>HUBS-UN005-v01</td>
<td>Facilities</td>
</tr>
<tr>
<td>HUBS-UN006-v01</td>
<td>Real-time information</td>
</tr>
<tr>
<td>HUBS-UN007-v01</td>
<td>Emergency call button</td>
</tr>
<tr>
<td>HUBS-UN008-v01</td>
<td>IVR</td>
</tr>
<tr>
<td>HUBS-UN009-v01</td>
<td>USB Charging Ports</td>
</tr>
<tr>
<td>HUBS-UN010-v01</td>
<td>Educational information</td>
</tr>
<tr>
<td>HUBS-UN011-v01</td>
<td>Bike Racks</td>
</tr>
<tr>
<td>HUBS-UN012-v01</td>
<td>Language Support</td>
</tr>
<tr>
<td>HUBS-UN013-v01</td>
<td>COTA Data</td>
</tr>
</tbody>
</table>

Requirement Description (Interactive Kiosk)
The touch screen shall display a static or animated screen or series of screens when the kiosk is not in use (as determined by a preset standby period of inactivity).

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constraint 2</td>
<td>Effective distance of Wi-Fi coverage (COTA is working with vendors to improve).</td>
</tr>
<tr>
<td>Constraint 3</td>
<td>The City is evaluating whether advertisement material may be permitted to be posted on infrastructure (kiosks) within right of way or on City property.</td>
</tr>
<tr>
<td>Constraint 4</td>
<td>Physical right of way and existing infrastructure may limit the features that a specific transit center facility can offer.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interface</th>
<th>Source Element</th>
<th>Destination Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUBS-IX2431-v01</td>
<td>IK Touch Screen</td>
<td>MMTPA/CPS Application</td>
</tr>
<tr>
<td>HUBS-IX2432-v01</td>
<td>MMTPA/CPS Application</td>
<td>IK Touch Screen</td>
</tr>
<tr>
<td>HUBS-IX2433-v01</td>
<td>Emergency Call Button</td>
<td>Columbus Emergency Call Center</td>
</tr>
<tr>
<td>HUBS-IX2434-v01</td>
<td>Columbus Emergency Call Center</td>
<td>Emergency Call Button</td>
</tr>
</tbody>
</table>
DEMETRIUS THOMAS  
Market Manager, Lyft

MARILYN MEHAFFIE  
CEO, St. Stephen’s Community House

DOUG ARSENEAULT  
Public Affairs Administrator, COTA
KIOSK

IK touch screen content shall allow customers to view information and the format shall be configurable to support kiosks for different operating locations and functionality, including location awareness and SMH services offered at each location.

HUBS-FN2344-V01
KIOSK
The IK system shall provide access to a web or app based interface with the MMTPA/CPS system to provide comprehensive trip planning and booking services and disseminate information regarding mobility providers, parking providers, and availability of various modes of transportation to the traveling public.

HUBS-IF2356-V01
RIDE SHARING

The ride share system shall have designated curb space allocated for pick-up from rideshare and taxi services.

HUBS-FN2388-V01
SYSTEM REQUIREMENTS EXAMPLE #4

DOCKLESS

Dedicated paved area shall be made available for dockless devices (scooters, ebikes, etc.) at the SMH facility.

HUBS-FN2442-V01
EMERGENCY CALL BUTTON

The street address, latitude, and longitude of the SMH facility shall be sent to the CECC to notify dispatchers of location of the help request.

HUBS-DR2321-V01
SITE ORGANIZATION

The bike share stations shall not impede flow of vehicle or pedestrian traffic.

HUBS-PR2301-V01
USER SECURITY

The IK system shall accommodate multiple tiers of user data security to allow distinct privileges to access data based on user roles (e.g. public user, administrator, service accounts, City and COTA personnel, data miner, external agency, etc.)

HUBS-SR2377-V01
WHERE WE GO FROM HERE

- System Requirements Specification
  July 2018 – November 2018

- Interface Control Document
  December 2018 – February 2019

- System Design
  August 2018 – March 2019

- Test Plan
  June 2019 – September 2019

- Procurement/Vendor Notice to Proceed
  March 2019 – August 2019

- Deploy / Testing
  August 2019 – April 2020

- SMH Go Live
  April 2020
HOW TO STAY CONNECTED

USDOT SMART CITY CHALLENGE PROGRAM INQUIRES:
Kate Hartman, Chief - Research, Evaluation and Program Management
Intelligent Transportation Systems Joint Program Office
Kate.Hartman@dot.gov

SMART COLUMBUS INQUIRES:
Alyssa Chenault, Communications Project Manager
anchenault@columbus.gov

Upcoming Smart Columbus Webinars:
• Connected Vehicle Environment System Requirements – 11/5
• Prenatal Trip Assistance ConOps – 11/14
• Event Parking Management System Requirement – 11/15
• Common Payment System System Requirements – 11/28
• Overview of Emerging Technologies: Connected Electric Autonomous Vehicles and Truck Platooning – 1/30

Webinar recording and materials will be available at itsa.org and smart.columbus.gov
Public comment period open for the SMART MOBILITY HUBS System Requirements:

- October 17th to October 31st

- Where to find it:
  - View the System Requirements at: [https://smart.columbus.gov/projects](https://smart.columbus.gov/projects)
  - Click SMART MOBILITY HUBS

- How to comment:
  - Please email comments to: [kldepenhart@columbus.gov](mailto:kldepenhart@columbus.gov)
  - Subject line: Smart Mobility Hubs Comments
    - Include your contact information
  - State whether or not you represent a vendor interest
QUESTIONS?
SIGN UP FOR OUR E-NEWSLETTER

Contact:
SmartColumbus@columbus.gov

LEARN MORE
Columbus.gov/smartcolumbus
@SmartCbus
This material is based upon work supported by the U.S. Department of Transportation under Agreement No. DTFH6116H00013.

Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the Author(s) and do not necessarily reflect the view of the U.S. Department of Transportation.