Essentials of the Smart Columbus Operating System
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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 Columbus Operating System | Product Vision and The Approach
• Smart Columbus Operating System | Architecture & Design, Development Approach
• Data Privacy
• Data Management
• Lessons Learned – So Far
• 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 COLUMBUS OVERVIEW
VISION

To empower our residents to live their best lives through responsive, innovative and safe mobility solutions.
MISSION

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
USDOT PORTFOLIO

ENABLING TECHNOLOGIES
- CONNECTED VEHICLE ENVIRONMENT

ENHANCED HUMAN SERVICES
- MULTIMODAL TRIP PLANNING/COMMON PAYMENT SYSTEM
- SMART MOBILITY HUBS
- MOBILITY ASSISTANCE
- PRENATAL TRIP ASSISTANCE
- EVENT PARKING MANAGEMENT

EMERGING TECHNOLOGIES
- CONNECTED ELECTRIC AUTONOMOUS VEHICLES
- TRUCK PLATOONING
THE PRODUCT VISION
IT TAKES A VILLAGE

Essentials of the Smart Columbus Operating System
OPERATING SYSTEM BIG PICTURE

Data Inputs

- Workers
- Citizens
- Public & Private Systems
- Devices & Things

Data Capture & Analysis

- Data Scientist & Researchers

Application hosting and connectors to other systems

Data Consumption

- Public
- Entrepreneur
- Universities
- Commercial Partners
- City
- USDOT
- Independent Evaluators
A SYSTEM OF SYSTEMS
OUR APPROACH TO ESTABLISHING THE OPERATING SYSTEM

• We created a village comprised of volunteers from private, public, entrepreneurial and academic sectors.
  • Advisory Committee
  • Leadership & Executive Committees
  • Hackathons & Private Sector Engagement
  • ODOT

• Procurement of Talent
TECHNICAL WORKING GROUP (TWG)

Data
- Identify use cases for data to solve community challenges & continue to make the city smarter

Technical
- Architecture & Design Recommendations
- Best Practices
- Tech Strategies
- Licensing / IP

Policy
- Data Management
- Data Privacy
- Open Data & Data Sharing
- Liabilities

Sustainability
- Sustainability models
- Offsetting cost
Essentials of the Smart Columbus Operating System

ARCHITECTURE, DESIGN & DEVELOPMENT APPROACH
Value Stories ensure the team focuses work on providing the most value first.
At every phase, we want to align on the current picture with shared understanding of the next picture.

Not Just Incremental …
Building little bits at a time

Incremental AND Iterative
Building a rough version, validating it, and gradually improving it
AS SMART COLUMBUS, I WANT TO EMPOWER OUR RESIDENTS TO LIVE THEIR BEST LIVES THROUGH RESPONSIVE, INNOVATIVE AND SAFE MOBILITY SOLUTIONS.
SMART COLUMBUS OPERATING SYSTEM
OUTLINE OF TOOLS

LAST UPDATED 10/5/18

Computing Services
AWS

Computing Platform
Kubernetes

Streaming Platform
Kafka

COTA Stream
CEAV Stream
MMTPA Streams

Microservices
Buses on Map

Producer
Consumer
Bus UI

Vis. & Analytics
JupyterHub

Notebook Instance #1
Notebook Instance #2
Notebook Instance #3

Data Platform
Kylo

Visualization
CrossRoads

Microservices
MMTPA Optimizations

Data Platform
CKAN Internal
CKAN External

KONG

Content Management
Joomla

Hortonworks
CloudBreak
Ambari
Nifi
Spark
Hive
S3

Key of Status:

- DEFINING
- PREPPING
- IN PROGRESS
- IN PRODUCTION
- NO LONGER REQUIRED
ESSENTIALS OF THE OPERATING SYSTEM

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
- Variety of data

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
# OPERATING SYSTEM ROADMAP

Rolling 6 month view

## PROGRAM MILESTONES

<table>
<thead>
<tr>
<th>KPI Support</th>
<th>CEAV-1st Streaming Shuttle</th>
<th>MMTPA Release 1</th>
<th>MMTPA Release 2</th>
<th>MMTPA Release 3</th>
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<td>1/17</td>
<td>4/1</td>
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## OS PROD DATES

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<th>COTA Bus UI</th>
<th>Ongoing</th>
<th>12/4</th>
<th>12/18</th>
<th>3/15</th>
<th>5/14</th>
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<td>12/18</td>
<td>3/15</td>
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<td>FUTURE</td>
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## FEATURES

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<tr>
<th>KPI Support</th>
<th>Data Platform 2.0</th>
<th>MMTPA Data Integration</th>
<th>Machine Learning Support</th>
<th>Application Hosting</th>
<th>Data Discovery</th>
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<td>Ingest</td>
<td>MMTPA Data Integration</td>
<td>Centralized Account Management (IDAM)</td>
<td>Application Hosting</td>
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<td>Data Discovery</td>
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### Notes

- CEAV = Connected Electric Autonomous Vehicle
- MMTPA = Multi-Modal Trip Planning Application
- KPI = Key Performance Indicator
- COTA Bus UI = Central Ohio Transit Authority Bus UI
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Smart Columbus
Operating
System

DATA PRIVACY
WHAT IS THE SMART COLUMBUS DATA PRIVACY PLAN?

• A high-level plan to protect privacy and secure data
  • Privacy controls
  • Security controls
  • Confidentiality
  • Review board

• A commitment to respect and to be a good steward of personal information
HOW WILL SMART COLUMBUS PROTECT AND RESPECT PERSONAL DATA?

• Be transparent
• Provide choice
• Respect expectations
HOW WILL SMART COLUMBUS PROTECT AND RESPECT PERSONAL DATA?

• Minimize data
• Secure data
• Shield identity
• Be accountable
WHO WROTE THE DATA PRIVACY PLAN?

• The Village
  • Policy Track of the TWG
  • Experienced privacy professionals and academics

• Researched and incorporated best practices

• State of the art plan
Essentials of the Smart Columbus Operating System

DATA MANAGEMENT
WHAT IS A DATA MANAGEMENT PLAN?

• A data management plan (DMP) is the overarching document providing guidelines on the treatment of data.
HOW DID WE DEVELOP THE DMP

• The Village
  • Policy Track of TWG
  • Experienced data professionals from local businesses
WHAT IS THE SMART COLUMBUS DMP?

• The DMP provides operational information for the use of the data within the Smart City Operating platform.
  • Utilizing best practices, the DMP offers standards on metadata management, data size, data acquisition, data access and data use.
LESSONS LEARNED
(SO FAR…)
AND WHAT’S NEXT

Essentials of the
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Operating System
OVERALL LESSONS LEARNED

• Agile is a cultural shift especially in government
• Always come back to the so what
• Center on the roadmap
• Managing in an agile world
• IT modernization is factor
Public comment period open for the DPP and DMP:

• October 9th - 17th

• Where to find it:
  • View the plans at: https://smart.columbus.gov/projects
    • Under "Department of Transportation Projects"
  • Direct link to DPP: http://bit.ly/SCOSDPP
  • Direct link to DMP: http://bit.ly/SCOSDMP

• How to comment:
  • Please email comments to: kldepenhart@columbus.gov
    • Subject line: SCOS /DMP / DPP Comments
      • Include your contact information
  • State whether or not you represent a vendor interest
### December Release

- **12/4**
  - Data Platform 2.0
    - Ingest
    - Discover/use
    - Migration
  - Streaming in Data Platform 2.0

### March Release

- **12/18**
  - MMTPA Data Integration

- **3/15**
  - Machine Learning Support
  - Centralized Account Management (IDAM)
  - Service Security Model

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HOW TO STAY CONNECTED

USDOT SMART CITY CHALLENGE PROGRAM INQUIRES:
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SMART COLUMBUS INQUIRES:
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Upcoming Smart Columbus Webinars:
• Smart Mobility Hubs
• Prenatal Trip Assistance
• Overview of Emerging Technologies: Connected Electric Autonomous Vehicles and Truck Platooning

Webinar recording and materials will be available at itsa.org and smart.columbus.gov
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SmartColumbus@columbus.gov

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QUESTIONS?
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