An Open Source SDK for Smart Cities

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February, 2017

Why an Open Source City SDK?

- **No app store specific to city applications**

- **No public mechanisms to share knowledge**

- **Cities with varying resources, capacity for innovation**

- **No leveraging of open source methodologies, communities**

- **Goal : City Web, an information-sharing platform**
  - *accumulation and replication of urban solutions and associated data and technologies*
  - *contributions from open source collaboration*
  - *open source software infrastructure*

**-- "*Technology and the Future of Cities*" Report,
President's Council of Advisors on Science and Technology, 2/2016**

Open SDK - An Open Source Smart City Framework And SDK

What is OPEN SDK?
- OPEN SDK will be both an open source software development kit (SDK) and an open source project whose goal is to enable, assist, and make more efficient the development of Smart City applications.

Scope
- The intended scope of the OPEN SDK is the entire vertical stack for an application, from the core IoT framework, including support of IoT sensors, devices and platforms, to data processing and analytics, cloud storage and client application enablement.

Who is it for?
- The OPEN SDK project is targeted at any developer writing applications for Smart City functionality, IoT environments, or even traditional web applications which might make use of the tools to more efficiently create their work.
- This includes commercial software developers, public sector employees, utility companies, academics, hobbyists, open source developers - anyone who would like to leverage open source technologies to build value-added software around it.

Why Open Source?
- Open Source is an extremely powerful, beneficial and successful methodology for the creation and distribution of software
  - It leverages a community of developers in a unified effort, reducing duplication, time to release, time to fix, and greatly increasing quality and productivity
  - Companies utilizing open source can focus their efforts on their own value-add rather than re-inventing the wheel, improving the efficiency of their software development
  - Its transparency and inclusiveness permits greater reliability, quality, monitoring and education
  - It avoids proprietary vendor lock-in and makes it easier to acquire skills to manage such software

What Would An Open SDK Stack Look Like?

User Applications

Open SDK Infrastructure

- Build Infrastructure & Tools
- Sample scripts & test libraries
- Self-certification for specific deployment environments

Example Open SDK Modules

mongo	cloud apis	opendata	**...**
logstash	kafka	Open BIM	GTFS

Database	Visualization	Language
Security	Cloud	Dev Tools
Logging	Messaging	Transport/Web
Analytics	Data Management	Data Processing
Monitoring	APIs	**...**

Device and Resource MGT (IoT)

IOTIVITY	OPEN SDK NIST PPI STANDARD	FIWARE	...?

Other Frameworks & APIS

ALLJOYN	APPLE HOMEKIT	SAMSUNG ARTIK	IBM BLUE MIX
GOOGLE WEAVE	AMAZON IoT	GE PREDIX	**...**

INTERNET APIS

OPEN SDK
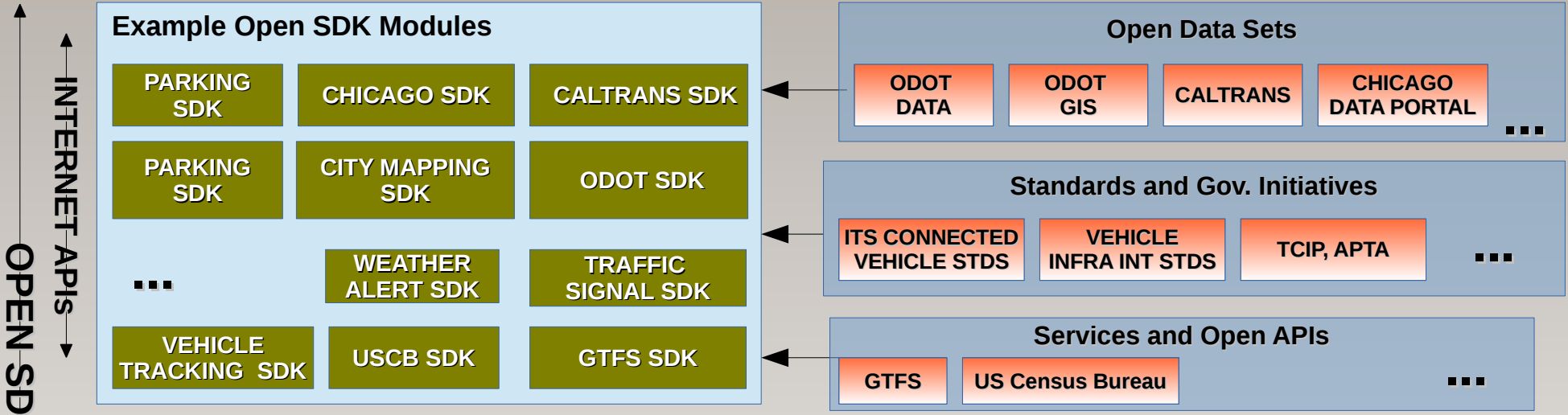
IoT STD

← **OPEN SDK** →   ← **EXTERNAL** →

USER

Customer HW + Embedded OS (Stock or custom) + NW Drivers

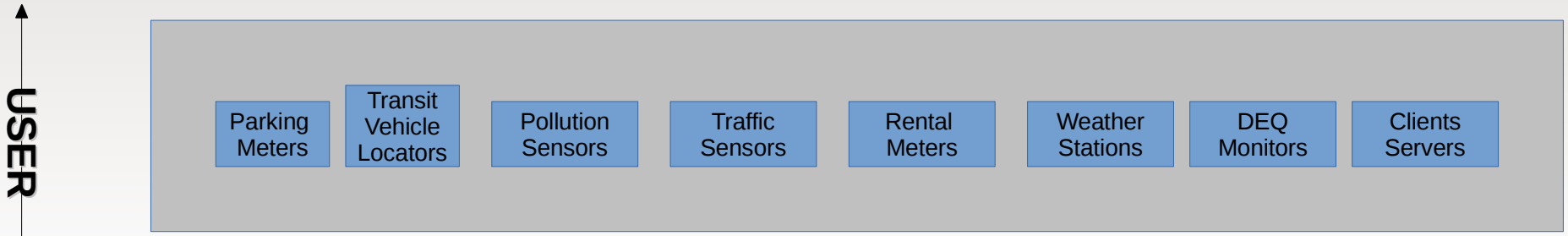**Legend: Items in the light blue squares will be code distributed by OPEN SDK**

What Would the Transit Stack Look Like?

User Applications (Transit, Weather, Environment, Resources...)

INTERNET APIS

OPEN SDK

IoT STD

Example Open SDK Modules

PARKING SDK	CHICAGO SDK	CALTRANS SDK
PARKING SDK	CITY MAPPING SDK	ODOT SDK
...	WEATHER ALERT SDK	TRAFFIC SIGNAL SDK
VEHICLE TRACKING SDK	USCB SDK	GTFS SDK

Open Data Sets

| ODOT DATA | ODOT GIS | CALTRANS | CHICAGO DATA PORTAL | ... |

Standards and Gov. Initiatives

| ITS CONNECTED VEHICLE STDS | VEHICLE INFRA INT STDS | TCIP, APTA | ... |

Services and Open APIs

| GTFS | US Census Bureau | ... |

Device and Resource MGT

| IOTIVITY | OPEN SDK NIST PPI STANDARD | FIWARE | STD NETWORK STACK |

USER

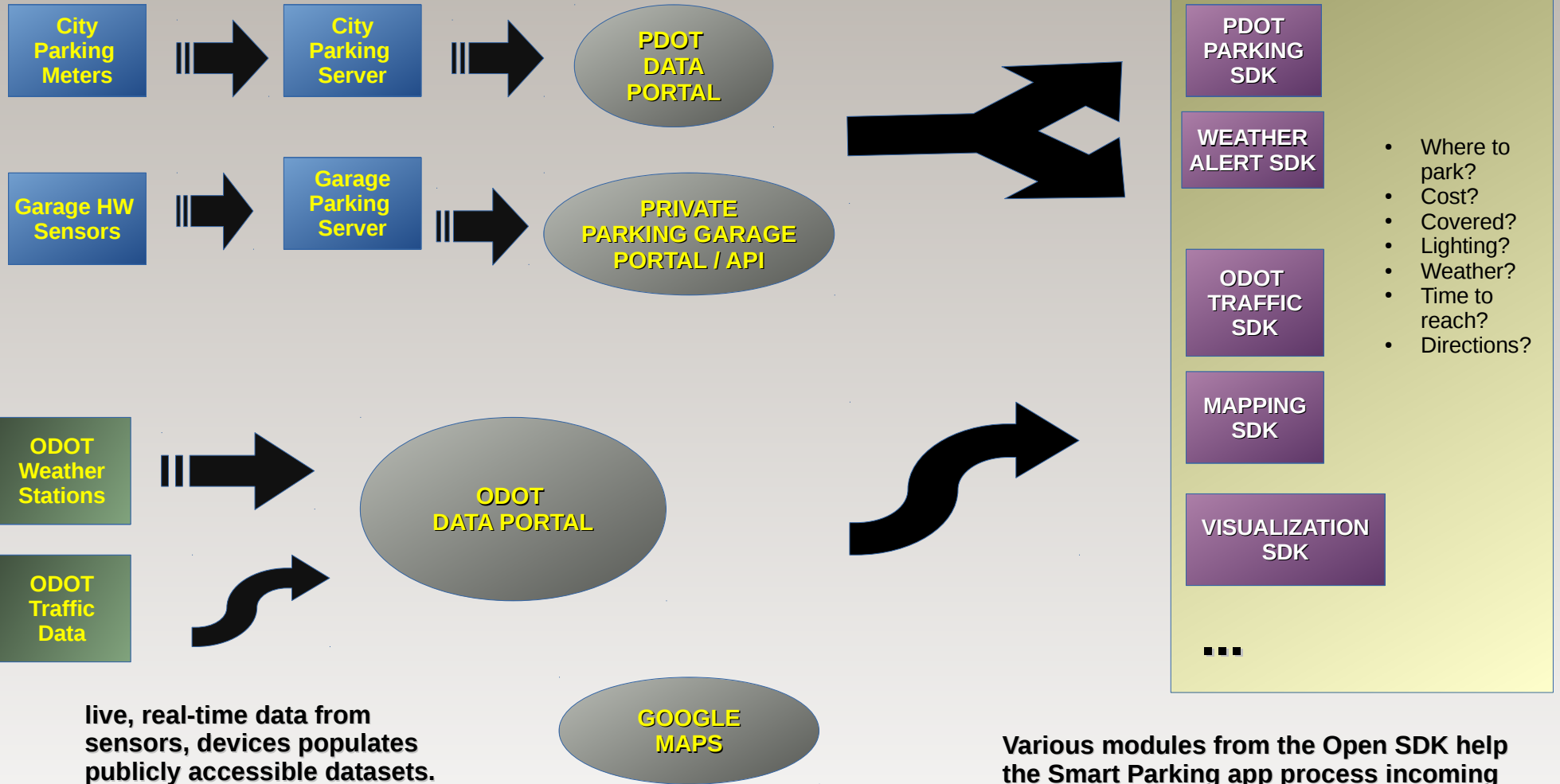| Parking Meters | Transit Vehicle Locators | Pollution Sensors | Traffic Sensors | Rental Meters | Weather Stations | DEQ Monitors | Clients Servers |

HW (Sensors, IoT Devices, etc.)

What Would a Smart City Parking App Look Like?

Potential IoT sensor <-> IoT
server implemented with
Open SDK stack (e.g. iotivity)

City Parking Meters

City Parking Server

PDOT DATA PORTAL

Garage HW Sensors

Garage Parking Server

PRIVATE PARKING GARAGE PORTAL / API

ODOT Weather Stations

ODOT Traffic Data

ODOT DATA PORTAL

GOOGLE MAPS

live, real-time data from
sensors, devices populates
publicly accessible datasets.

Smart Parking App

PDOT PARKING SDK

WEATHER ALERT SDK

ODOT TRAFFIC SDK

MAPPING SDK

VISUALIZATION SDK

- Where to park?
- Cost?
- Covered?
- Lighting?
- Weather?
- Time to reach?
- Directions?

...

Various modules from the Open SDK help
the Smart Parking app process incoming
data from the datasets via APIs, access
cloud services and perform common
functions, etc. This would reduce the amount
of coding effort and complexity for the app,
and help adhere to a common API and tools.

QUESTIONS

Please use the available cards to provide responses to questions 1- 4.
If you'd like to respond to question 5-6, or provide any other input, please email
daniel.frye@urban.systems. We appreciate hearing from you!

1. **Your: name, org, email**

2. **Would such an SDK be of interest to your organization?**

3. **Would you be interested in sharing code, research, best practices, etc. relevant to smart cities?**

4. **Is there open data, open APIs, services that you are interested in making available for public consumption?**

5. **Are there any components or services of interest that you would like to see?**

6. **Are there any guidelines, standards, tools that your org. has to comply with, or open source policy?**

Thank You!