



AWS Smart Cities and the Internet of Things

Amazon Web Services

May 2017

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Consumer Business

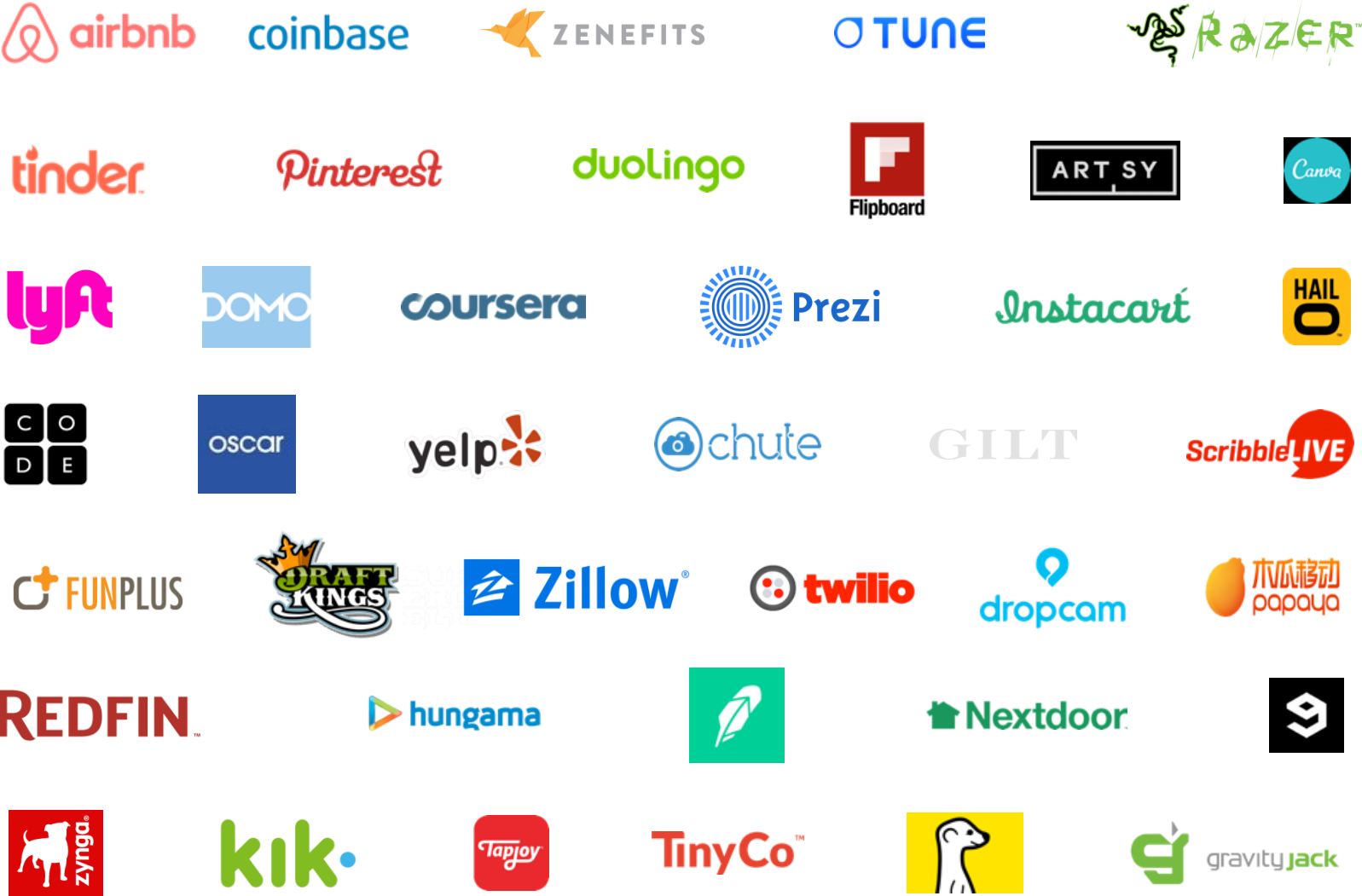
Seller
Business

IT Infrastructure
Business

<https://aws.amazon.com>

Today we support millions of organizations
in over **190 countries**
around the world become
more agile and more innovative

Including Some of the World's Greatest Startups



The World's Best Enterprises



And Broadly Across The Public Sector As Well

2,300



Government Agencies



7,000



Education Institutions



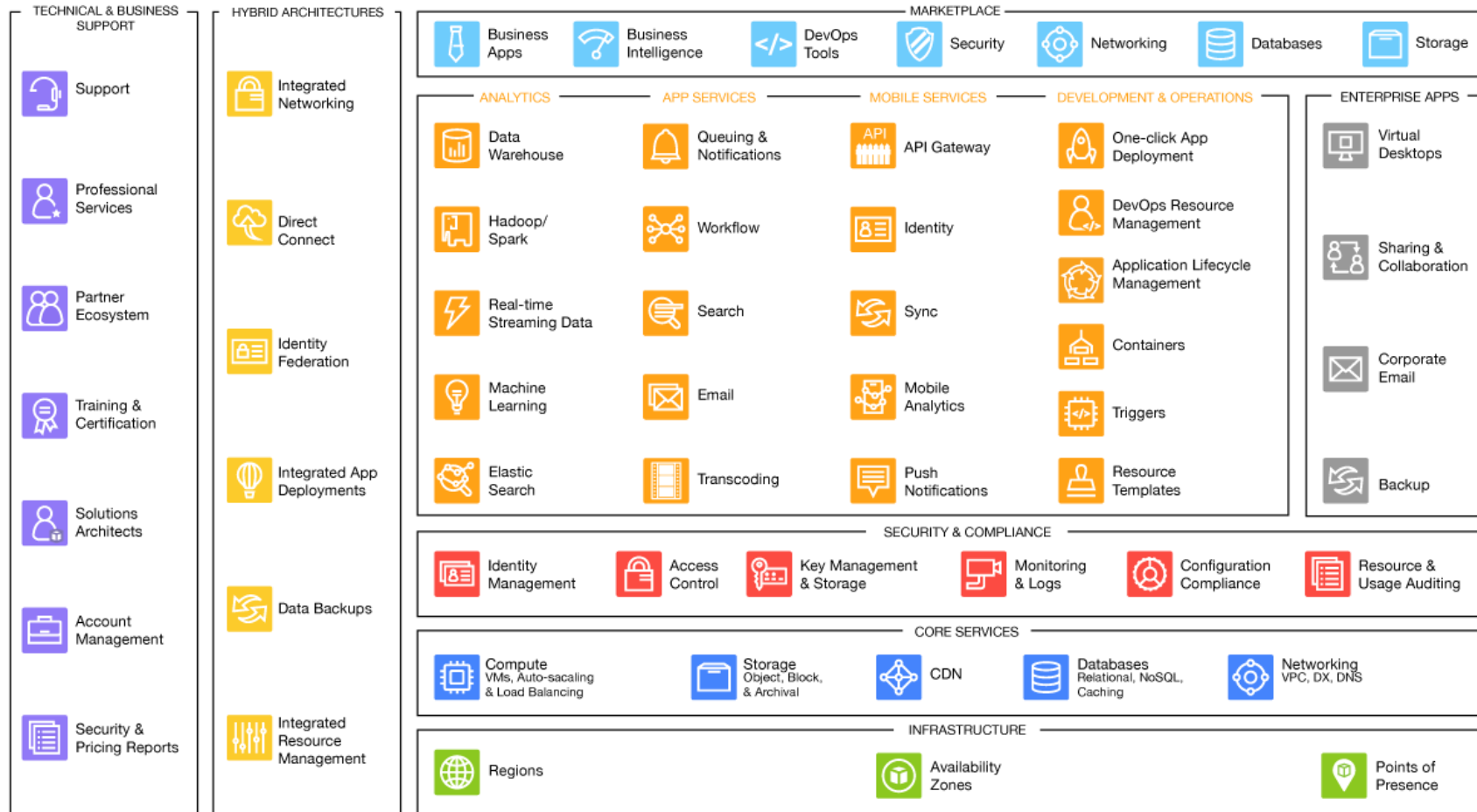
22,000



Nonprofit Organizations



By Offering A Wide Selection of Cloud Based Services



Agenda

- Overview
- IoT in Public Sector
- AWS IoT & AWS Platform
- Customer Adoption

Internet of Things (IoT)

26 Billion connected units will be installed by 2020

Key Factors include:

- Lower price point of sensors, processors and networking
- Increased connectivity
- Reducing cost of data storage and compute



Economic value impact is estimated to be up to \$11T by 2025

- Large quantities of data to be analyzed and processed
- Every industry vertical and domain expected to be impacted

Sources:

<https://www.gartner.com/doc/3086918/market-guide-iot-platforms>

http://www.mckinsey.com/insights/business_technology/the_internet_of_things_the_value_of_digitizing_the_physical_world

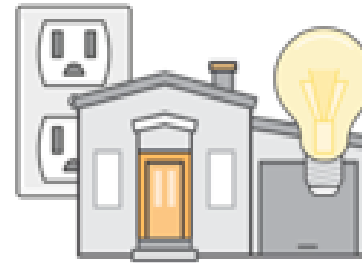
Across Many Industries



Healthcare and Life Sciences



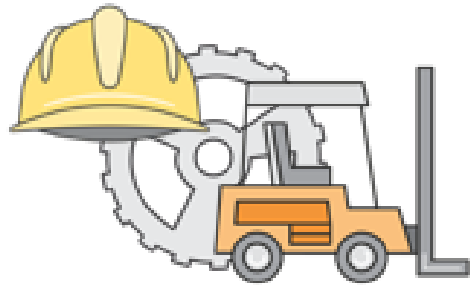
Municipal Infrastructure



Smart Home



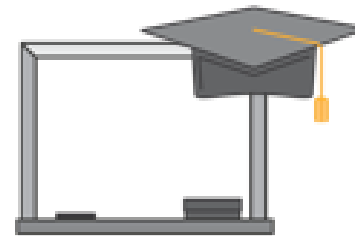
Retail



Manufacturing, Logistics & Supply Chain



Agriculture



Education



Automotive

Impact of IoT

Cost Savings

Reduces costs, optimize use of resources, allows for real-time feedback

Efficiency

Fine-tune practices and innovate novel services based on data

Decision Making

Enables real-time decision making

Improved Innovation

Improved citizen service delivery based on data, e.g. improved traffic flow, water management, safer pedestrian traffic

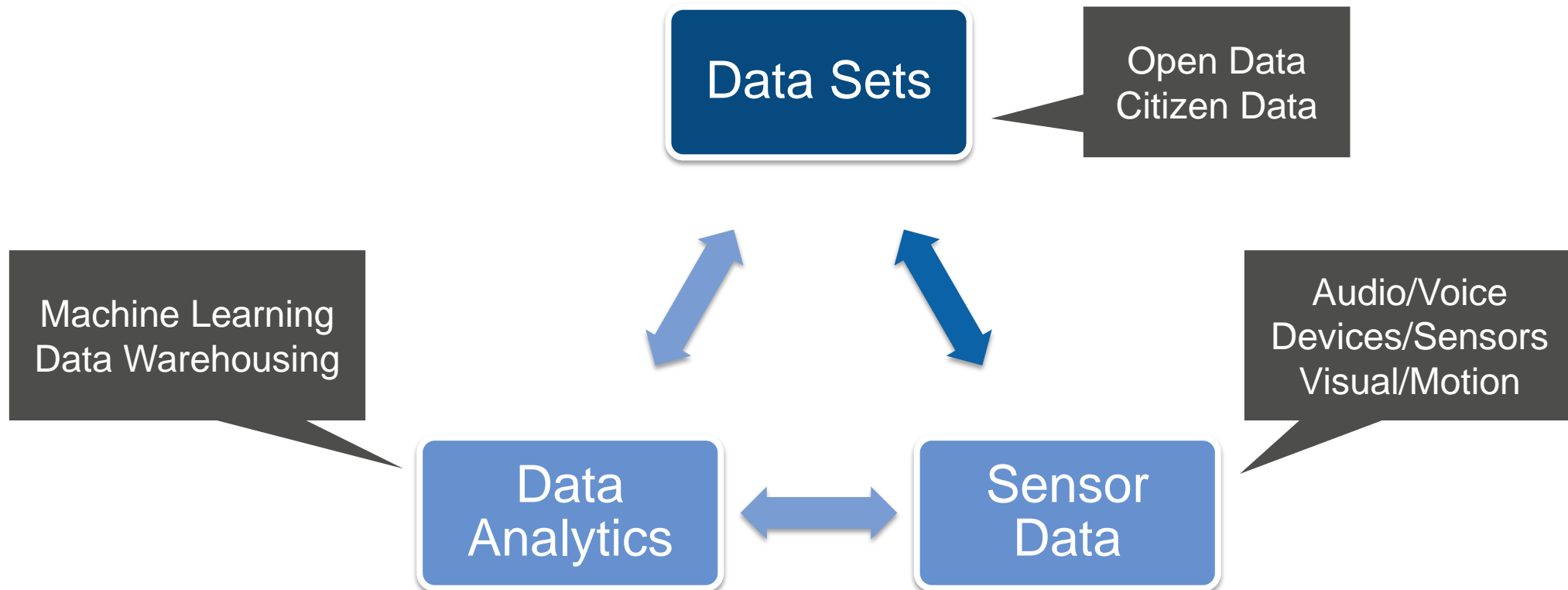
IoT and Smart Cities

AWS works with our public sector customers to help implement robust, cost effective, secure, and scalable IoT solutions.

Smart Transportation	Integrated Safety Solutions	Smart City	Connected Healthcare
(Transportation)	(Public Safety)	(City Services)	(Public Healthcare)
<ul style="list-style-type: none">▪ Parking Solutions▪ Connected smart intersections▪ Smart routing / navigation▪ Fleet tracking / monitoring	<ul style="list-style-type: none">▪ Crowd control / management▪ Officer safety▪ Emergency notification▪ Security solutions	<ul style="list-style-type: none">▪ Water control / management▪ Trash and garbage collection▪ Lighting control and water metering▪ Infrastructure monitoring▪ Building automation systems	<ul style="list-style-type: none">▪ Patient tracking and monitoring▪ Integrated healthcare with at-home care

IoT's role in Smart Cities

IoT alone cannot help a city to become digitally transformed
The power of data from multiple sources – once analyzed –
is what makes a city Smart



Heavy Lifting With IoT

Fully managed cloud platform that lets connected devices easily and securely interact with cloud applications and other devices



Devices

Connect Billions
of Devices



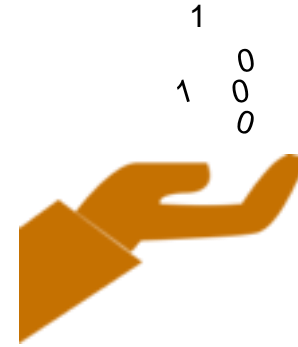
Network

Lightweight
Communication
Protocol



Security

X509 Certificates



Data Collection

DynamoDB,
Kinesis, and S3



Smarts

Trigger Lambda
Functions

Benefits of AWS IoT Platform

Connect and Manage

Devices can communicate with each other even if they use different or custom protocols

Secure Devices and Data

Provides authentication and end-to-end encryption throughout all points of connection, applying policies with granular permissions

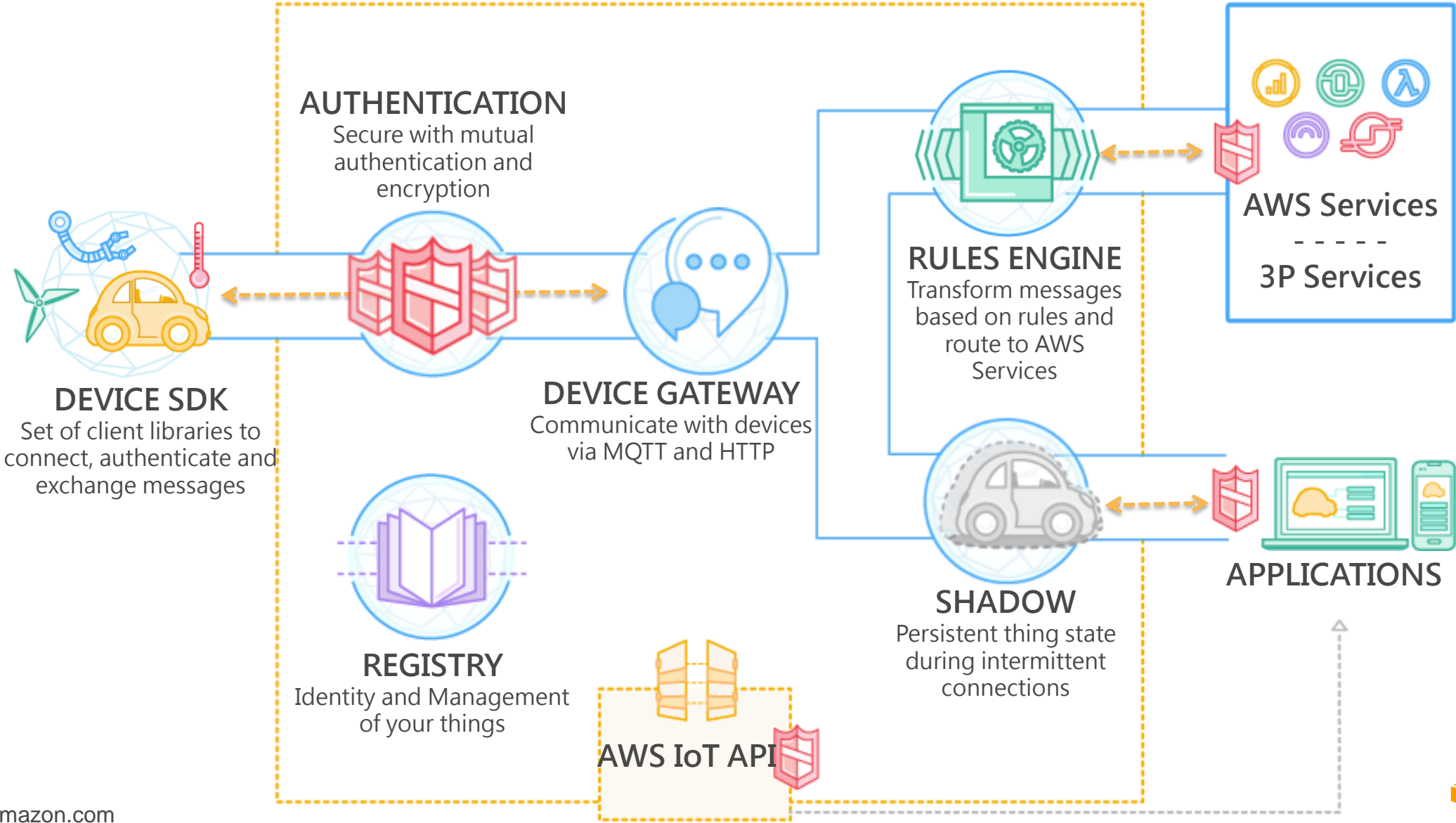
Process and Act on Data

Filter, transform, and act upon device data on the fly, based on business rules that you define

Create a “Shadow”

Device Shadows store the last reported and desired future state of each device even if device is offline. You can retrieve the last reported state of a device or the desired future state through the API or by using the rules engine

AWS IoT: How it Works



AWS Customers making an impact with IoT



- Uses AWS to stream, analyze, store, and share data collected by 200,000 telematically-enabled machines to provide growers with timely and accurate data for optimal growing conditions.
- John Deere can help farmers take action on real-time developments on their farms, plant more efficiently, and improve the yield of their crops.

AWS re:Invent 2015 Keynote | Patrick Pinkston, VP Information Solutions, John Deere (7:12)



[Video Testimonial](#)

AWS Customers making an impact with IoT

PHILIPS

- The Philips HealthSuite digital platform analyzes and stores **15 PB** of patient data gathered from **390 million** imaging studies, medical records, and patient inputs
- Running on AWS provides the reliability, performance and scalability that Philips needs to help protect patient data as its global digital platform grows at the rate of one petabyte per month.

Philips Uses AWS to Analyze 15 PB of Patient Data (7:35)



[Video Testimonial](#)

AWS Customers making an impact with IoT



Fleet Tracking
And Monitoring



Street Lighting



DNA Sequencing
Instruments



Equipment
Management



Connected Car
Device



Video Monitoring



Asset and vehicle
Tracking



Consumer Smart
Device Electronics

AWS IoT Hardware Partners

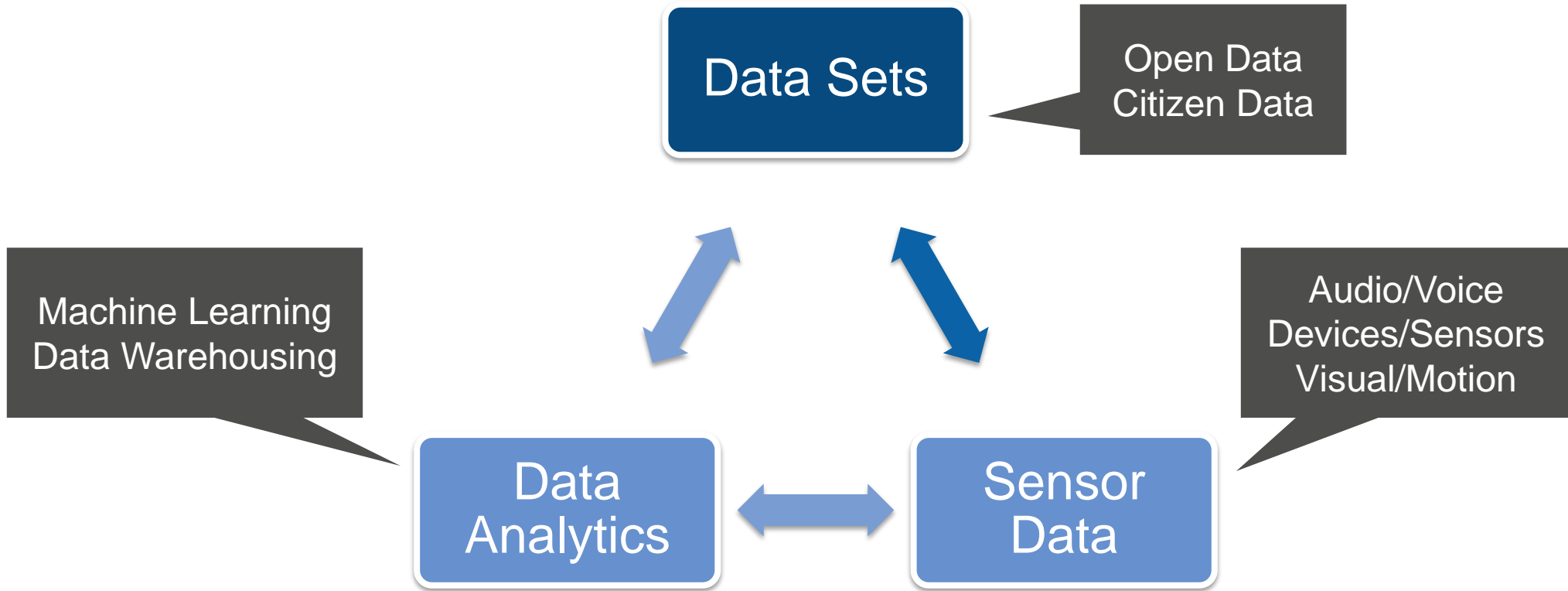
MARVELL®



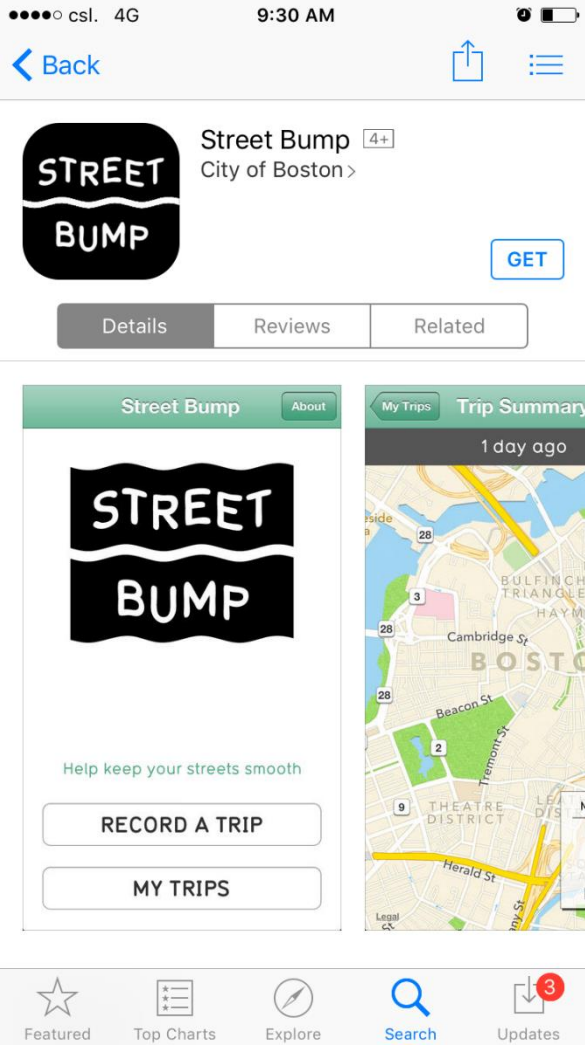
IoT's role in Smart Cities

IoT alone cannot help a city to become digitally transformed.
The power of data from multiple sources – once analyzed – is real.

Remember This Slide?



Street Bump App Screen Shot



Data + Sensors + Analytics = Smart City

Street Bump: Fix that Road

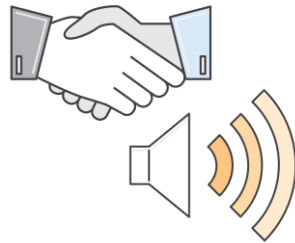
Data

Mapping and maintenance datasets



Sensors

Mobile app collects real-time data about road conditions



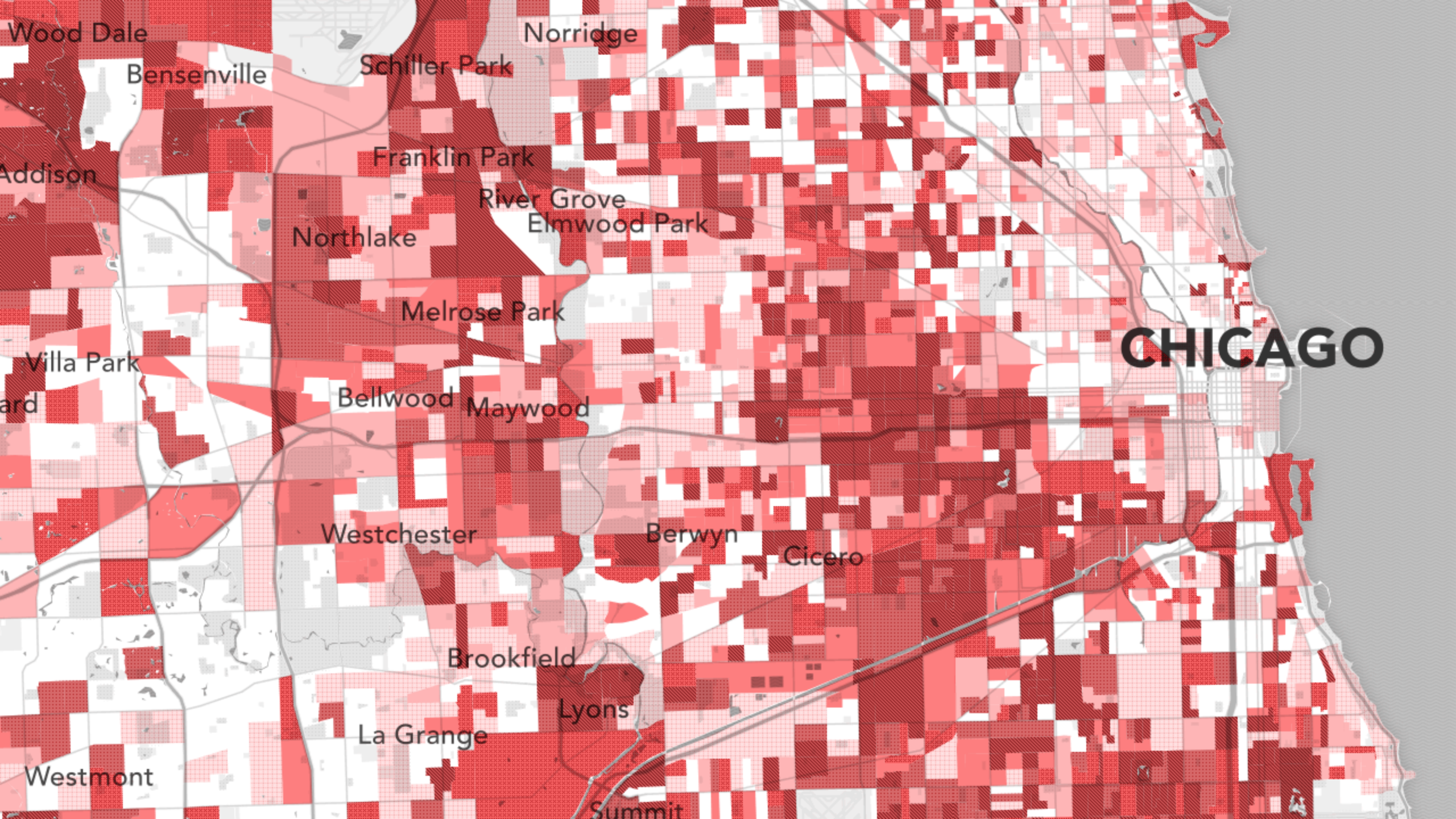
Analytics

Solution analyzes data and identifies potential spots for repair



Impact

- Governments can make decisions about city improvements based on road conditions; plan for long term investments
- Other potential opportunities:
 - Inform commuting patterns
 - Inform procurement and allocation of road improvement equipment



Data + Sensors + Analytics = Smart City

Enigma: Fire Risk Analysis

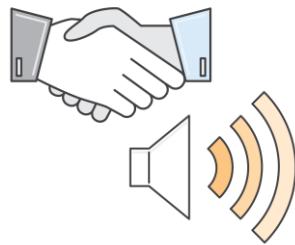
Data

Open Data about
Fires in New Orleans



Sensors

Fire Alarm Feeds in
real-time



Analytics

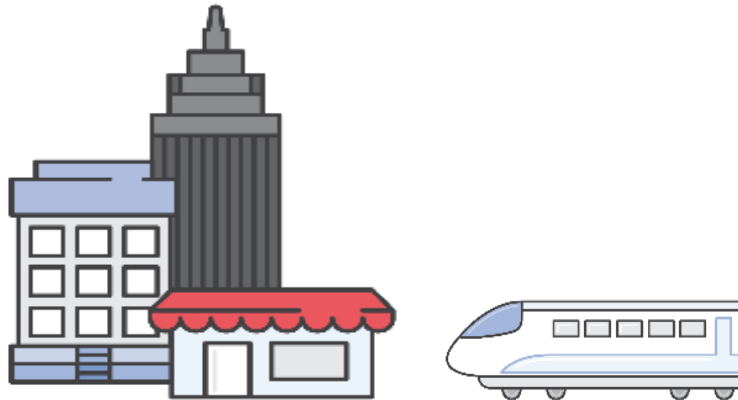
Predict Fire Alarm
Deficiencies



Impact

- Distribute life-saving smoke alarms to New Orleans' most vulnerable residents
- For US cities, assign risk score to a city or county based on jurisdictional local fire data
- Other potential opportunities:
 - Allocate emergency vehicles based on risk score

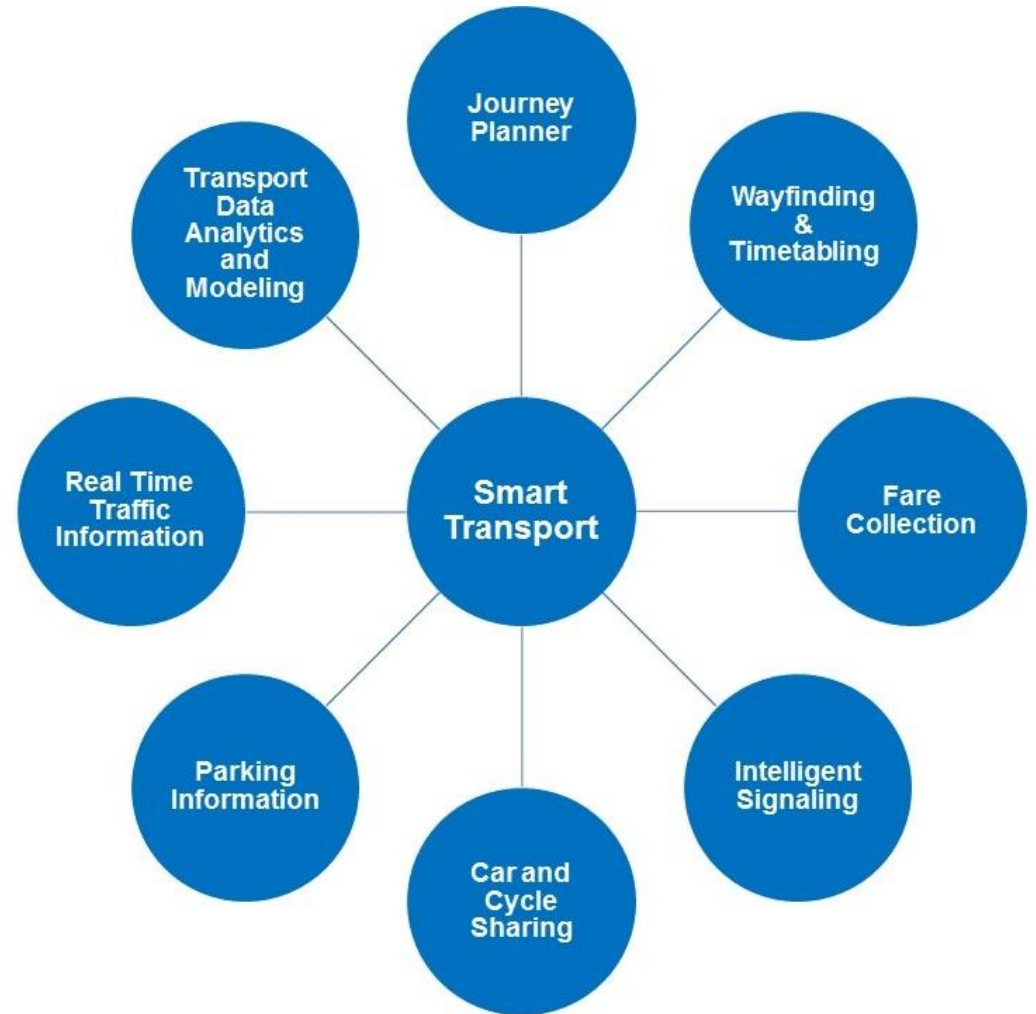
Deep Dive: Smart Transport Journey Planner and Open Data API for Cities (Transport for London)



The Smart Transportation Industry is Growing

Public Transport organizations are providing smart multimodal services to citizens combining;

- The Physical - Roads, Trains, Metro, Buses, Taxis, etc...
- With the Virtual - Internet, Web, Mobile App, Sign Board, Ticketing and Electronic Payment, Automatic Speech Recognition (ASR), etc...



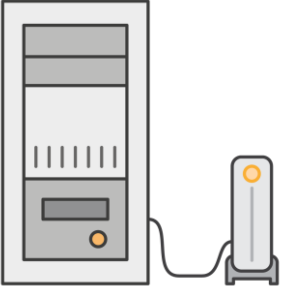
Challenges in Cities Today



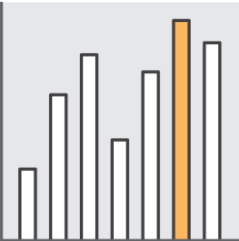
Shrinking Budgets



Public Scrutiny



Aging Systems

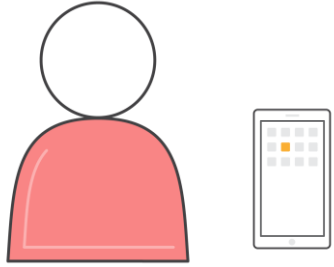


Increased Demand



Faster Pace of
Technology Innovation

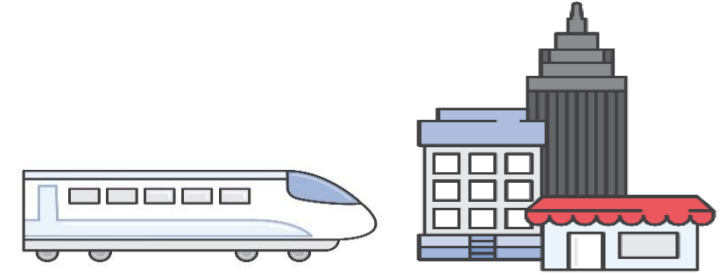
Transport Trends in Cities



Increased Expectations Of
Tech Savvy Customers



Road Congestion Hurting
Economic Productivity



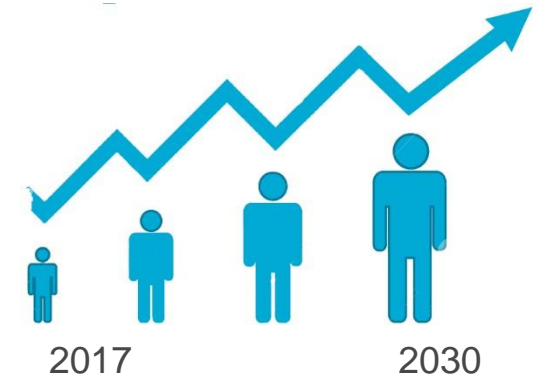
Public Transport Infrastructure
Already at Capacity



Legacy Transport Organizations
With Multiple Stand Alone Data Sets



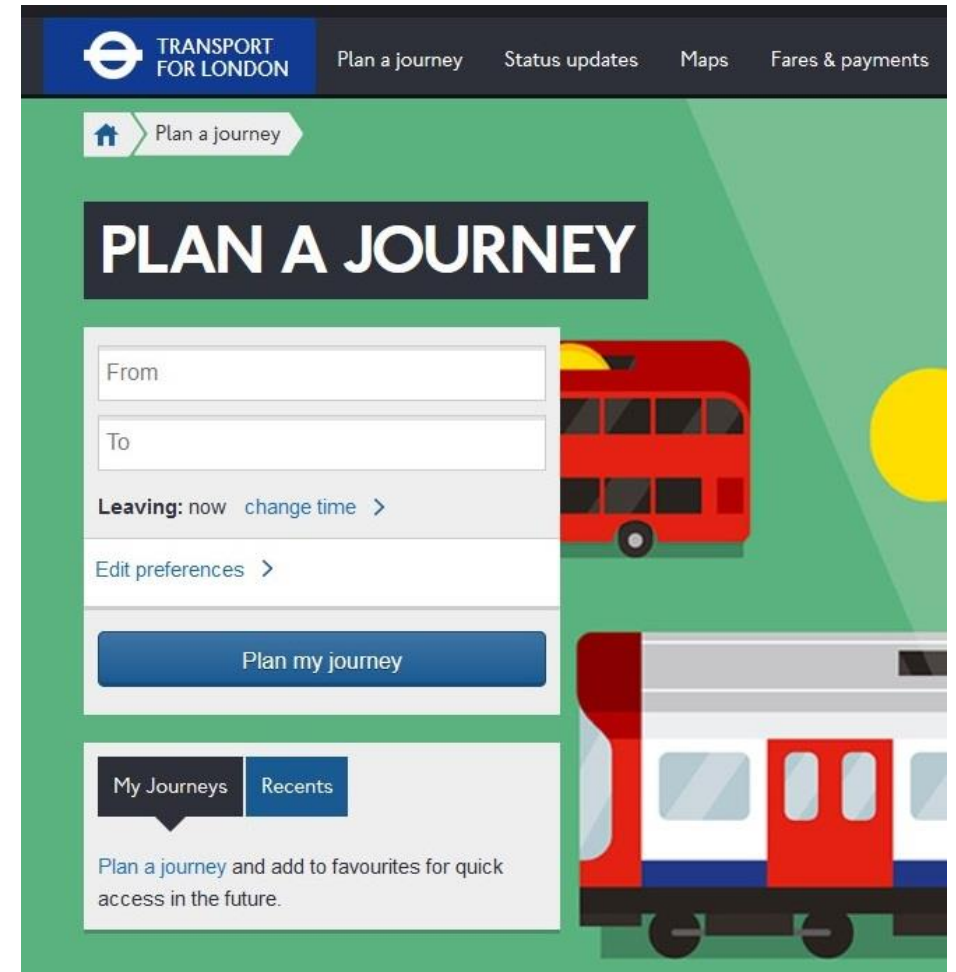
Increased Demand Particularly from
Mobile Devices in Real Time



City Population
Continues to Age & Grow

TfL Open Data Journey Planner on AWS

- Example AWS Public Sector Customer:
 - Transport for London (TfL)
- Technology:
 - Transport information Journey Planner **Web Site** with an **Open Data API** provides city transportation data to citizens.
 - Igniting a Developer Network to generate innovative **Mobile Applications** around open city data.

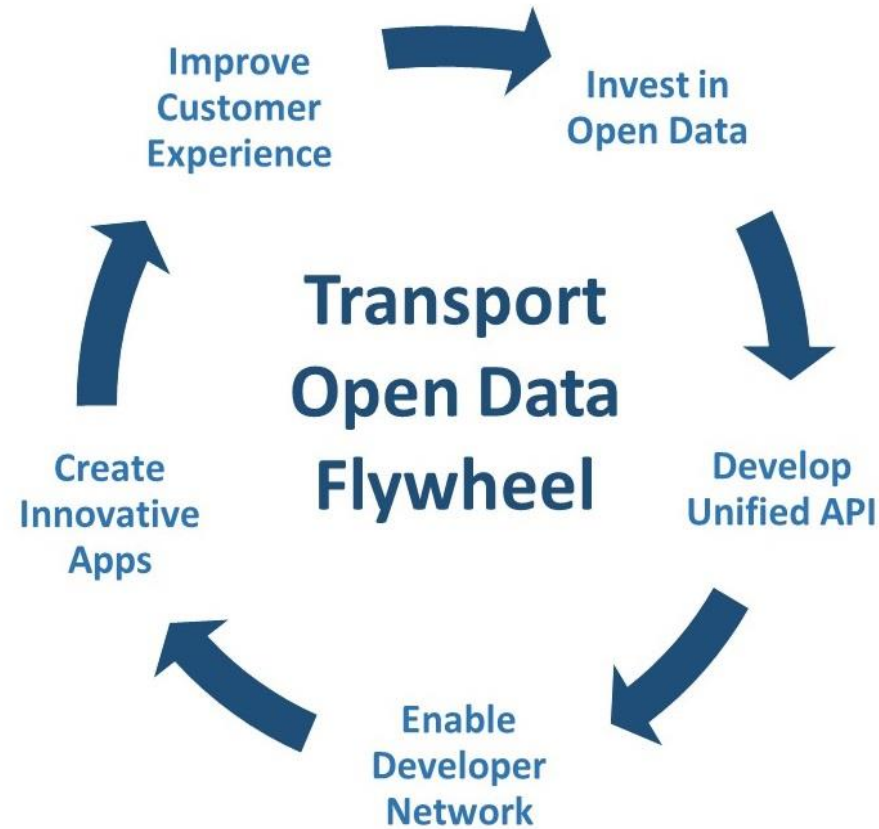


With an Open Data Planner and Unified API, You can Kick Start

- ✓ **Innovation** - Spark the creativity of a developer network,
- ✓ **Niche Products** - Create new markets on availability data,
- ✓ **Customer Reach** - Provide information where they are,
- ✓ **Data Transparency** - Release data trapped in silos,
- ✓ **Customer Satisfaction** - Improved customer planning,

The TfL Open Data Road Map Led to Results

- *31 million journeys per day*
- 83% of Londoners use web site
- 43% Use travel applications
- TfL 80% Savings on Operations of Journey Planner w/Cloud



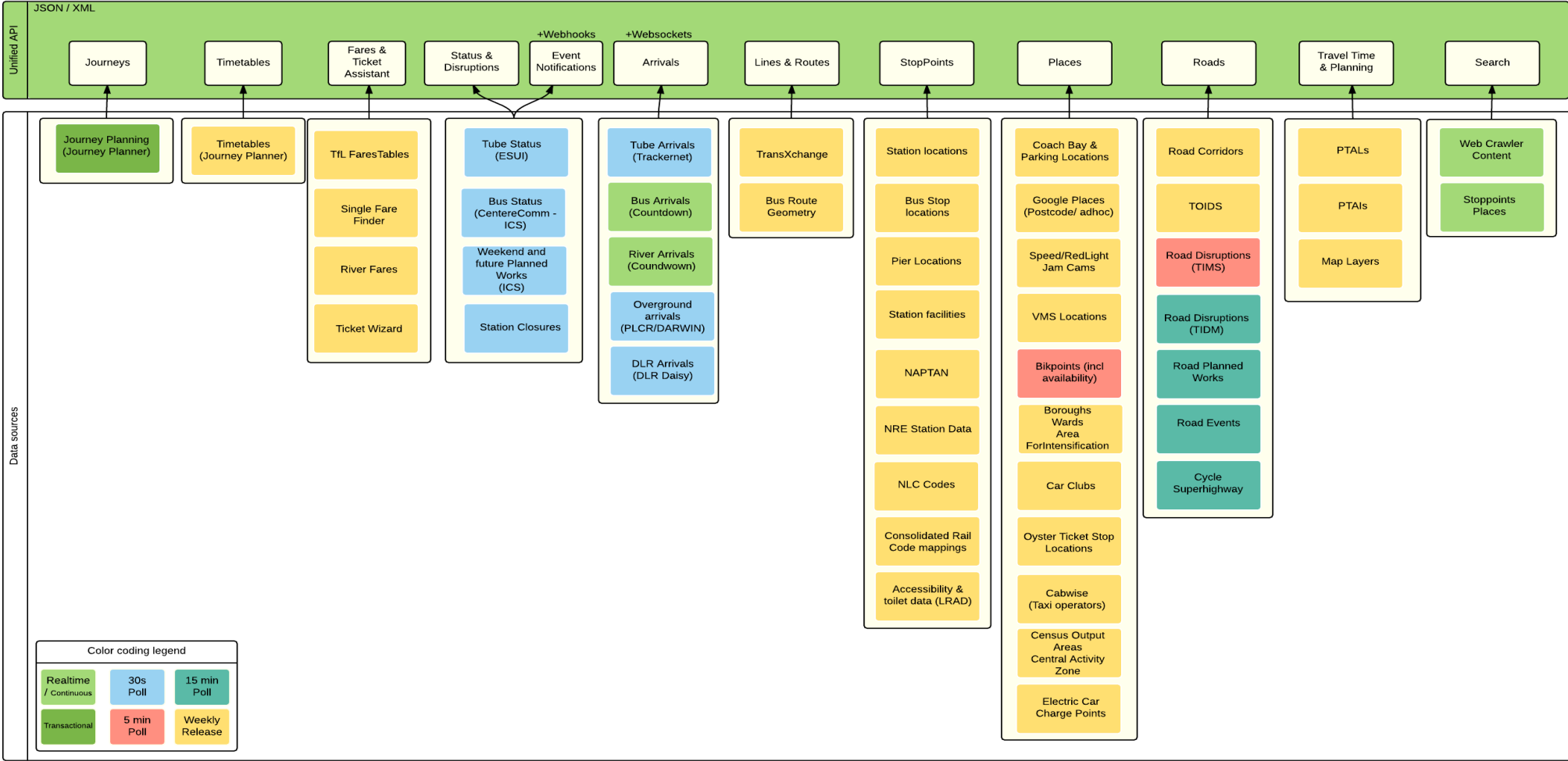
- 19 Legacy data silos
- *More than 200 data sources*

- *20 million visits per month*
- Unified API open access

- *More than 600 apps and growing*
- Specialized (niche) products
- Accessibility, air quality, other

- 11,000 Plus API users and growing
- 1000 Plus tech jobs in London
- *Millions in transport application investment from external sources*

TfL's Unified API Data Elements



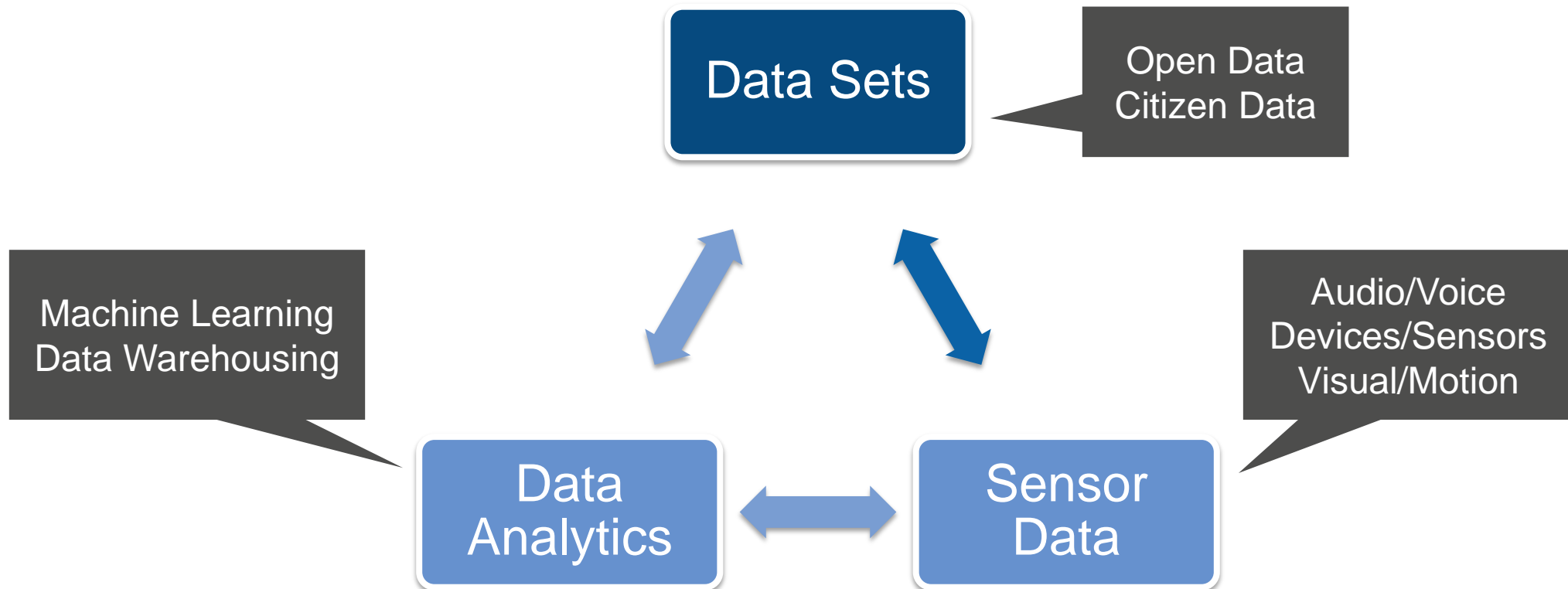
TfL Open Data Outcomes - Financial

- Deloitte study estimated £15m-£58m per annum benefits from customer time saved in apps powered by TfL open data
- Usage has doubled since – bringing the estimate to £30m-£116m per annum.
- Significant investment in app development firms has attracted hundred of millions of pounds in technology investment in London and elsewhere off the back of our data
- Around 1,000 jobs estimated to be enabled by this open data ecosystem

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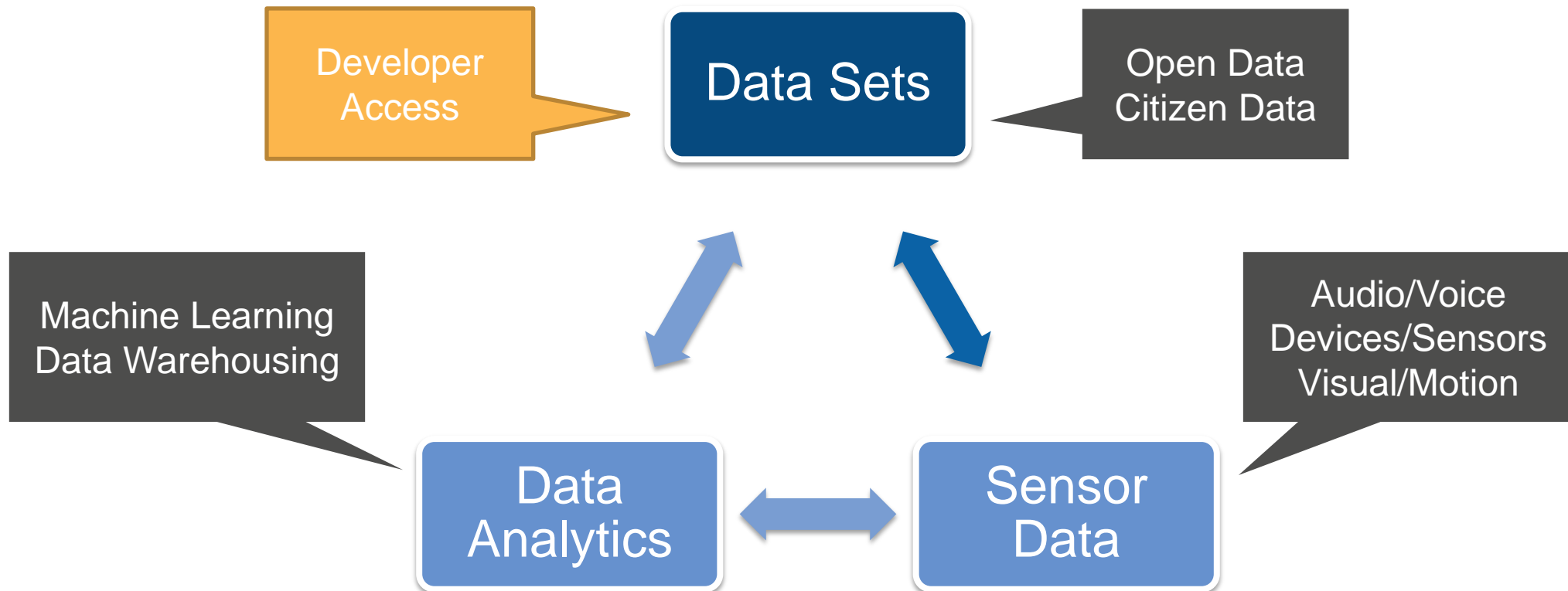
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