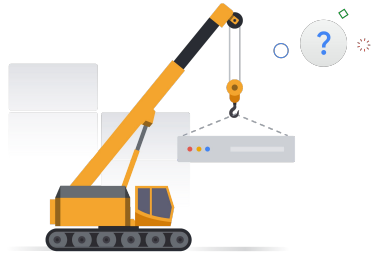# Smart Mobility - Embracing a culture of innovation

Dr Lara Suzuki
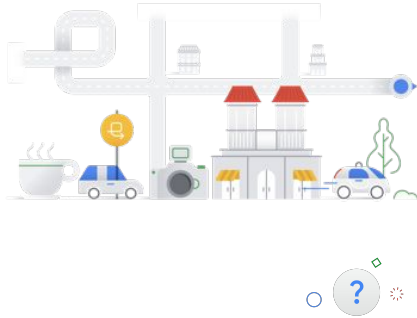
Technical Director, Office of the CTO

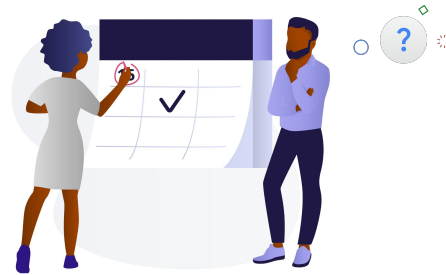# The century of urban transformation

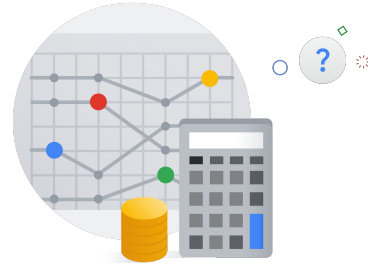What Infrastructure we will need?

Where will it go?

How will we deliver it?

How will we pay for it?

Speed and Scale

Speed and Scale of smart urbanization & refurbishment to accommodate growing urban populations is most important

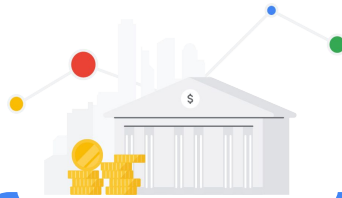**Citizen Satisfaction**

With better economics, efficiency

With better Sustainability

Google

Citizens Demands

We want to promote Happy Citizens

For service providers to have Better Economics and Cost Savings

To be Sustainable, Lower Carbon

- Actionable feedback
- Saving in cost of living
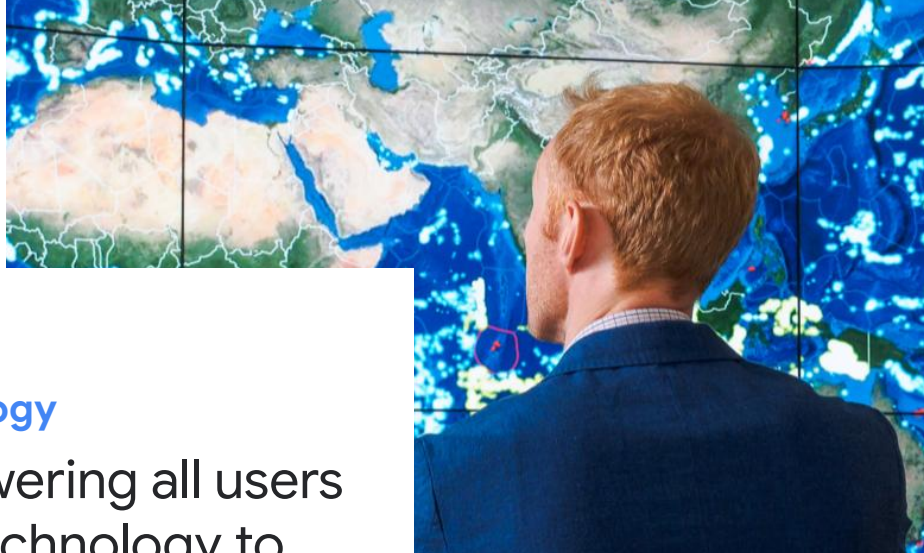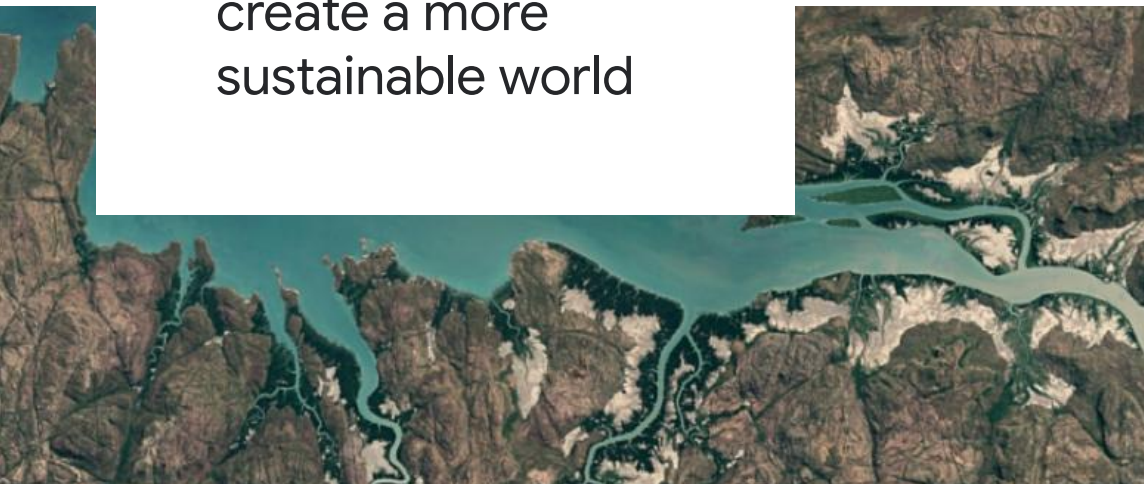- Higher safety in spaces
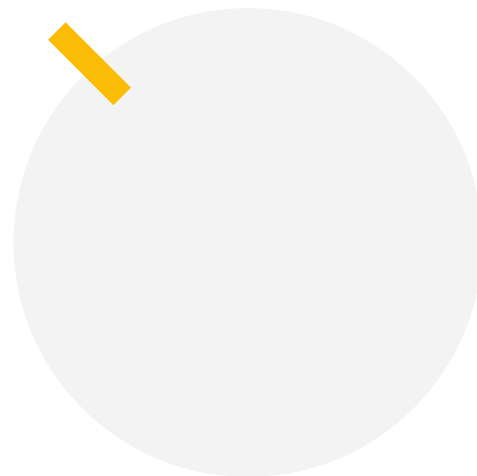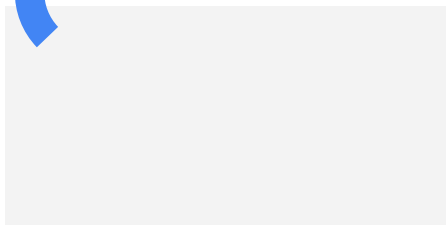- Higher delight factor
- Greater sustainability

Google

Technology

Empowering all users with technology to create a more sustainable world

Smart Mobility

Google

We do search but also a lot of research

Smart Mobility

Open datasets for urban, environmental and geospatial analysis
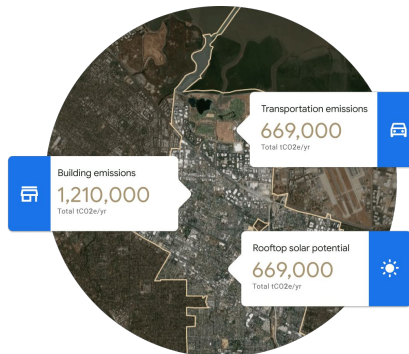# Free to use resources for the environment assessment and decision making

Waze for Cities

A freely available program for cities and other qualifying public entities that provides access to raw Waze data such as traffic jams, alerts or irregularities provided via API as a feed or via BigQuery dataset.

Environmental Insights Explorer

Uses exclusive data sources and modeling capabilities in a freely available platform to help cities measure emission sources, run analyses, and identify strategies to reduce emissions - creating a foundation for effective action.

Transportation emissions
669,000
Total tCO2e/yr

Building emissions
1,210,000
Total tCO2e/yr

Rooftop solar potential
669,000
Total tCO2e/yr

Google Earth Engine

A freely available multi-petabyte catalog of satellite imagery and geospatial datasets with planetary-scale analysis capabilities to help cities to detect changes, map trends, and quantify differences on the Earth's surface.

Google Cloud

Passenger Mobility: Multimodal transport system

ENTUR

➤ ENTUR collects and analyzes data from 60 transports; captures 21K daily departures across 3,000 routes.

➤ Leverages open-source tech with over 100 microservices.

➤ Conducts data-driven sales operations, ticketing, multi-modal services across all public transportation options.

Key benefits of Google:

- **Cuts the cost** of infrastructure maintenance
- Provides a **flexible and open foundation** on which to build services
- **Scales** up and down seamlessly to meet customer demand
- Unlocks **new insights** through AI/ML, allowing **real-time data analysis** on a petabyte scale

"We needed to move away from a monolithic, traditional style of development to a microservices-driven, agile way of working. Google Cloud was the obvious choice to achieve that. Microservices are facilitated by the Kubernetes technology that Google originally created. We wanted to use the most up-to-date version without the risk of vendor locking."

—*Tor Magnus Castberg, Team Lead, Entur*
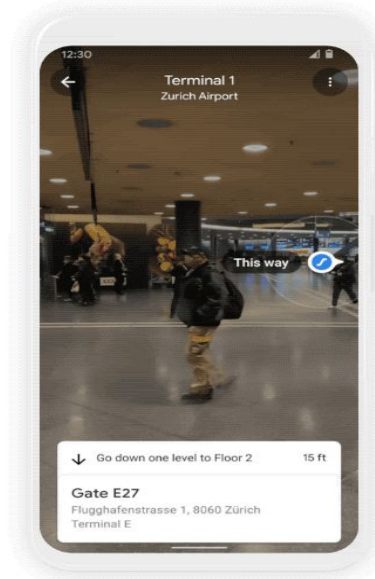
Passenger Mobility: Augmented Reality

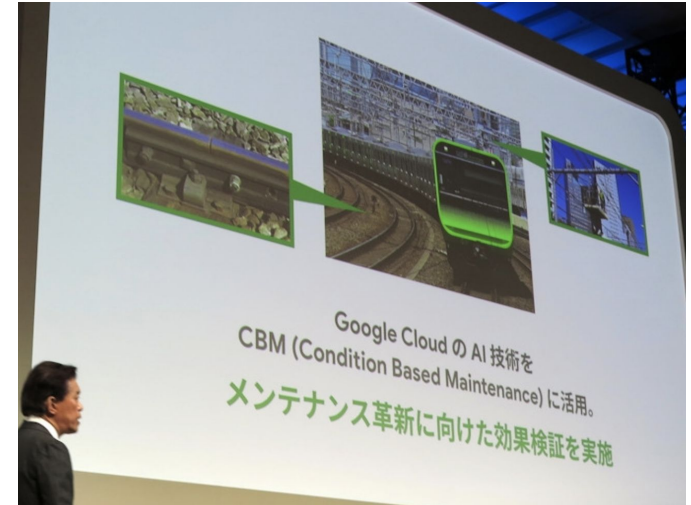| Maps & Commerce | Navigation | Safety |

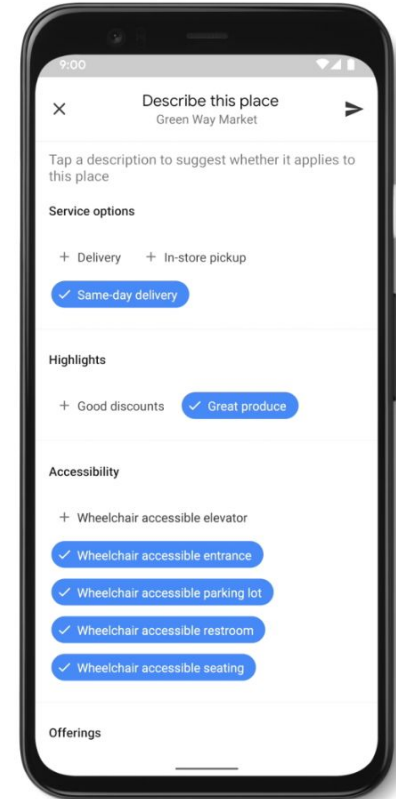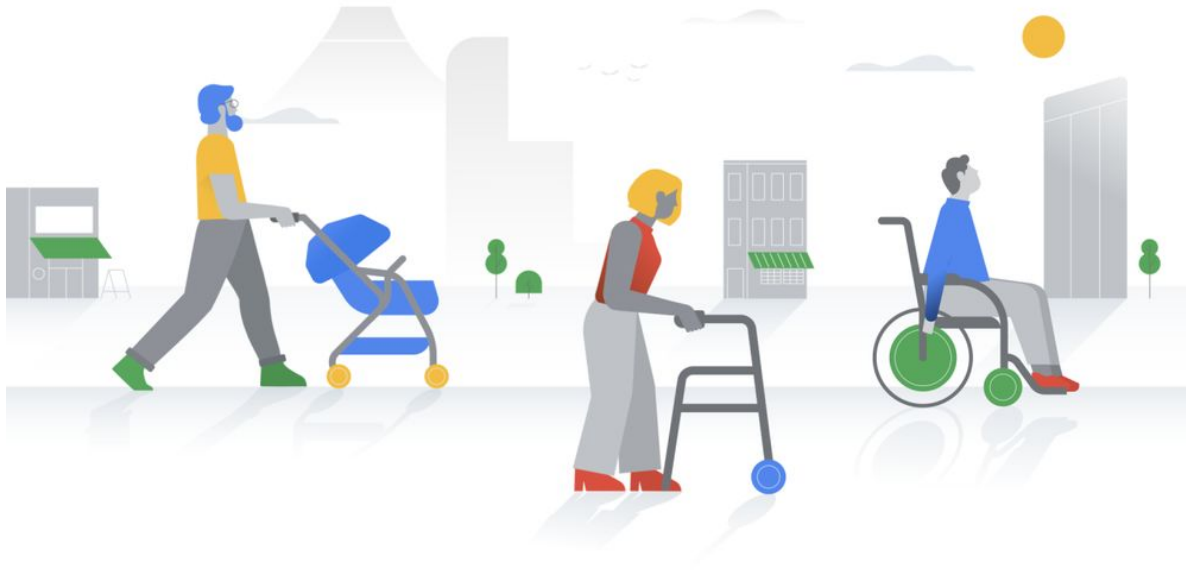Real-time location/delays & seamless ticket purchasing

Indoor AR navigation experiences at key station and public facilities

AI Visual Inspection for preventative maintenance

Passenger Mobility: Accessibility for wheelchair users

Mobility Infrastructure: Smart Parking

SMART PARKING

➢ SMART PARKING provides end-to-end smart parking/smart city solutions globally.
➢ Uses event-driven architecture from parking sensors to provide real-time insights for operational efficiencies and user convenience.
➢ Also provides city-level insights for future planning on parking infrastructure.

- Reduced smart parking/smart city IoT installation and operational support effort by more than half
- Enabled development of a Smart Cloud IoT platform in just four months and operate at city-scale.
- Democratised data access and use across the organization

"By running on Google, we were able to develop our SmartCloud Platform at an incredible pace. We built the core infrastructure in under four months."

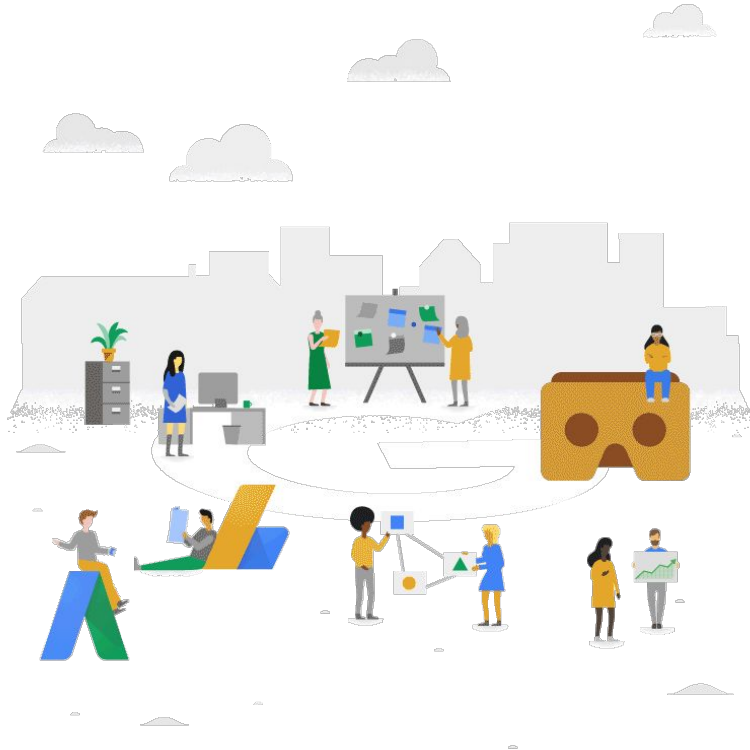*—Brian Granatir, Technical Team Lead, Smart Parking*

Smart Parking

Drivers looking for available parking spaces are not only wasting their time and fuel, their vehicles are also adding to the congestion in the city and emitting CO_2.

Smart parking: savings of **900,000** tons of harmful CO_2 in Germany alone
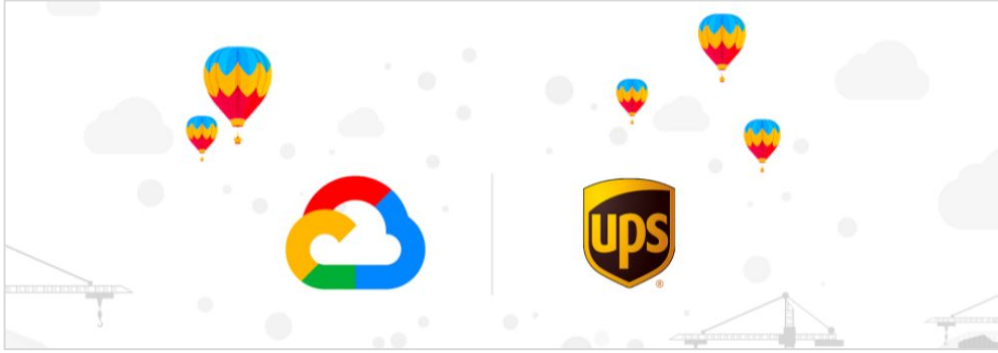
Google

Smart Parking

Smart parking replaces all these fragmented offline things and replaces it by **data**

Data is available to drivers at the points where they may need to make a decision and allowing them to make a decision where to go and therefore giving them back time

- **Hasse-free parking**
- **Easy decision making**
- **Delightful navigation**

Google

Mobility Infrastructure: Smart logistics

*Working in collaboration with Google Cloud Platform (GCP), UPS was able to design routing software that tells the delivery driver exactly where to go, every step of the way. The routing software **saves the company up to $400 million a year**, and **reduces fuel consumption by 10 million gallons a year**.*

-- Juan Perez, Chief Information Officer at UPS

Today, Google Cloud BigQuery helps UPS power the **most precise & comprehensive forecasting** in the company's history.

GCP provides the capacity to **run machine learning models across 1 billion data points per day**, including package weight, shape and size, and facility capacity across the network. The insights extracted from that data help inform UPS on how to load delivery vehicles, make more targeted operations adjustments, and minimize forecast uncertainty, especially around the holidays.

Connected Vehicles

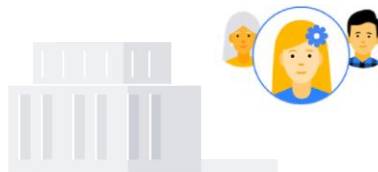# Our connected vehicle solution is the centerpiece to create smart experiences in vehicles

Data from ERP, CRM, parts, dealerships, suppliers

Dashboards, UI, insights, reports, applications

Business & Customers

Platform

Applications & Vehicle Services

Smart Analytics

Data Platform

Applications, software updates
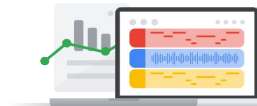
Real-time vehicle health data & telemetry

Fleet

Google Cloud

The Heart of Smart Mobility Platform

01

Capture

Data ingestion
at any scale

02

Process

Reliable streaming
data pipeline

03

Store

Data lake and
data warehousing

04

Analyze

Data warehousing

05

Visualize & Predict

Advanced
Analytics and AI
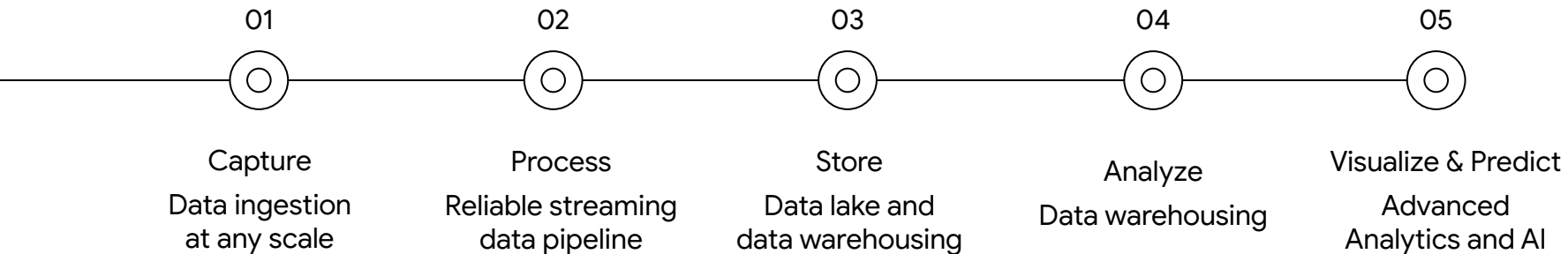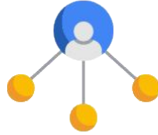
Google

Google's AI Principle

1. Be socially beneficial.

2. Avoid creating or reinforcing unfair bias.

3. Be built and tested for safety.

4. Be accountable to people.

5. Incorporate privacy design principles.

6. Uphold high standards of scientific excellence.

7. Be made available for uses that accord with these principles.

Thank you