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Cutting carbon where it matters the most: How SDG&E innovates with AWS

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The 3 D's are driving transformations toward a clean energy future



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Carbon reduction opportunity

AWS can lower the carbon footprint of average on-premises data center workloads by nearly 80% today

US
3.6 times more energy efficient

Europe
Up to 5 times more energy efficient

Asia Pacific
5 times more energy efficient



Find all the reports at
aws.amazon.com/sustainability/resources/

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Reinvention is underway



Greenko uses AWS IoT and serverless for wind monitoring

In India, Greenko uses IoT and serverless for wind power monitoring and grid systems management to maximize integration of renewable resources on the grid



Vector builds a new energy platform on AWS

Vector uses cloud-enabled IoT, ML, and big data analytics to engage with customers and the edge of the network to actively manage peak demand growth



Engie uses AWS data and analytics to go carbon-neutral

Engie built its Common Data Hub on AWS to break down data silos and, using ML, increased efficiency of its renewable fleet and improved customer interactions

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“It’s not just about technology”



Is it a one-way or a two-way door?

San Diego Gas & Electric

Cutting carbon where it matters most: How SDG&E innovates with AWS

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About SDG&E

San Diego Gas & Electric (SDG&E) is an innovative San Diego–based energy company that provides clean, safe, and reliable energy to better the lives of the people we serve in San Diego and southern Orange counties



4,000+
employees



3.7M
customers



1.5M
electric meters



905K
gas meters



17.4K
power line miles



4,100 sq. mi
in San Diego & S. Orange Counties



44.5%
energy from renewable sources

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Industry fundamentals are changing



Increasing climate risks

Increasing climate risks, including wildfires, require adaptation



Increasing climate policies

Growing policy mandates to decarbonize energy across all sectors



Rising customer expectations

Increasing customer expectations and our ability to serve existing customers, fueled by technology



Elevated cybersecurity risks

Rising cybersecurity risks and the need to support a remote workforce increase organizational resiliency needs



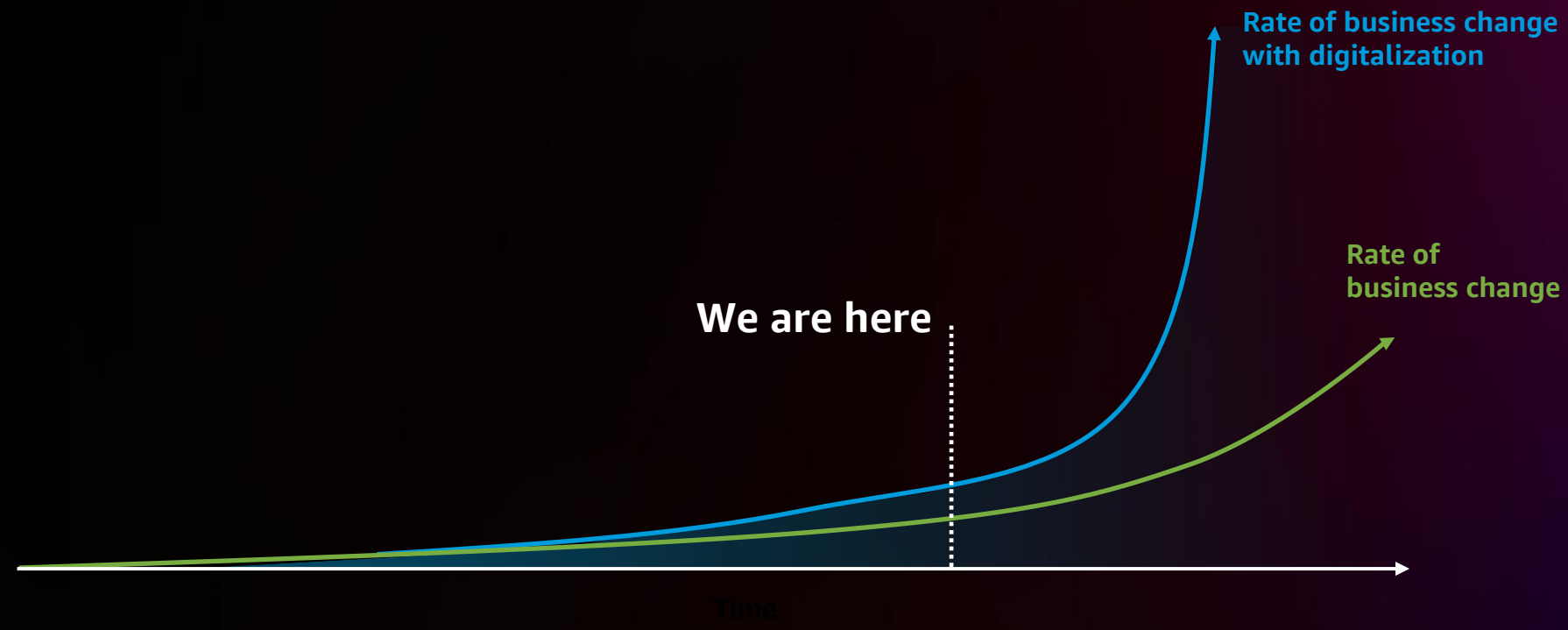
Accelerating pace of business change

Accelerating pace of business change across all sectors, driven by the rise of digital and emergent technologies

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Digitalization is accelerating the rate of business change



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Innovation framework

Innovation engine → Product teams

Learn

through rapid prototyping and proof of concepts

- Feasibility assessment
- Strategic fit assessment
- Value/impact assessment

Prove

value through benefits case and analysis, and

- Cost/benefit assessment
- Risk assessment
- Investment decision

Scale

at an enterprise level to maximize business value

- Detailed solution/architecture
- Use case backlog and prioritization
- Benefits tracking

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Innovation engine portfolio

PAST

FUTURE

AI for asset & damage detection

Virtual agents for self-service

Computer vision for external object detection

Abatement optimization modeling

Generative artificial intelligence

Metaverse – innovation acceleration

IOT network, safety & wearables

Robotic process automation

Community safety applications

Digital twin telematics and AI for fleet decarbonization

"Innovation Center" virtual collaboration space

Augmented reality for engineering & construction

Blockchain for carbon credit tracing

Cognitive & intelligence RPA

Natural language processing for speech detection

AI for satellite imagery analysis

WiNGs visualization

Alexa Weather for wildlife safety

Virtual Wildfire & Climate Resilience Center (WCRC)

Intelligent OCR pipeline

Fleet IoT sensors

Virtual & augmented reality for training

Fleet & mobile imagery acquisition

Clean transportation lead generation

Digital Twin Community Impact Platform

IoT foundational networking

Customer sentiment analysis & social listening

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Bringing communities into focus

Viewing our investments through a community and equity lens

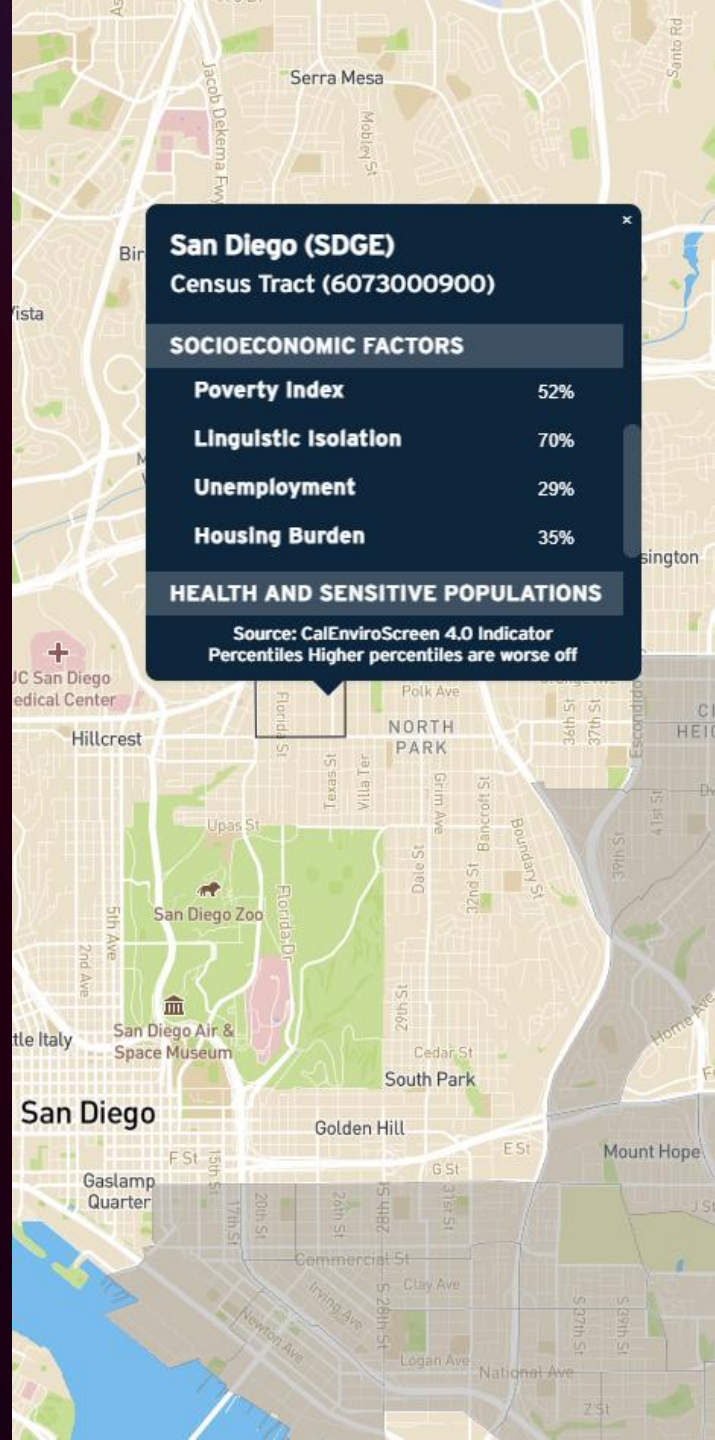
Bringing transparency and awareness to how our investments in carbon neutrality, electrification, and reliability prioritize the right communities at the right time

Deriving insights and informing actions

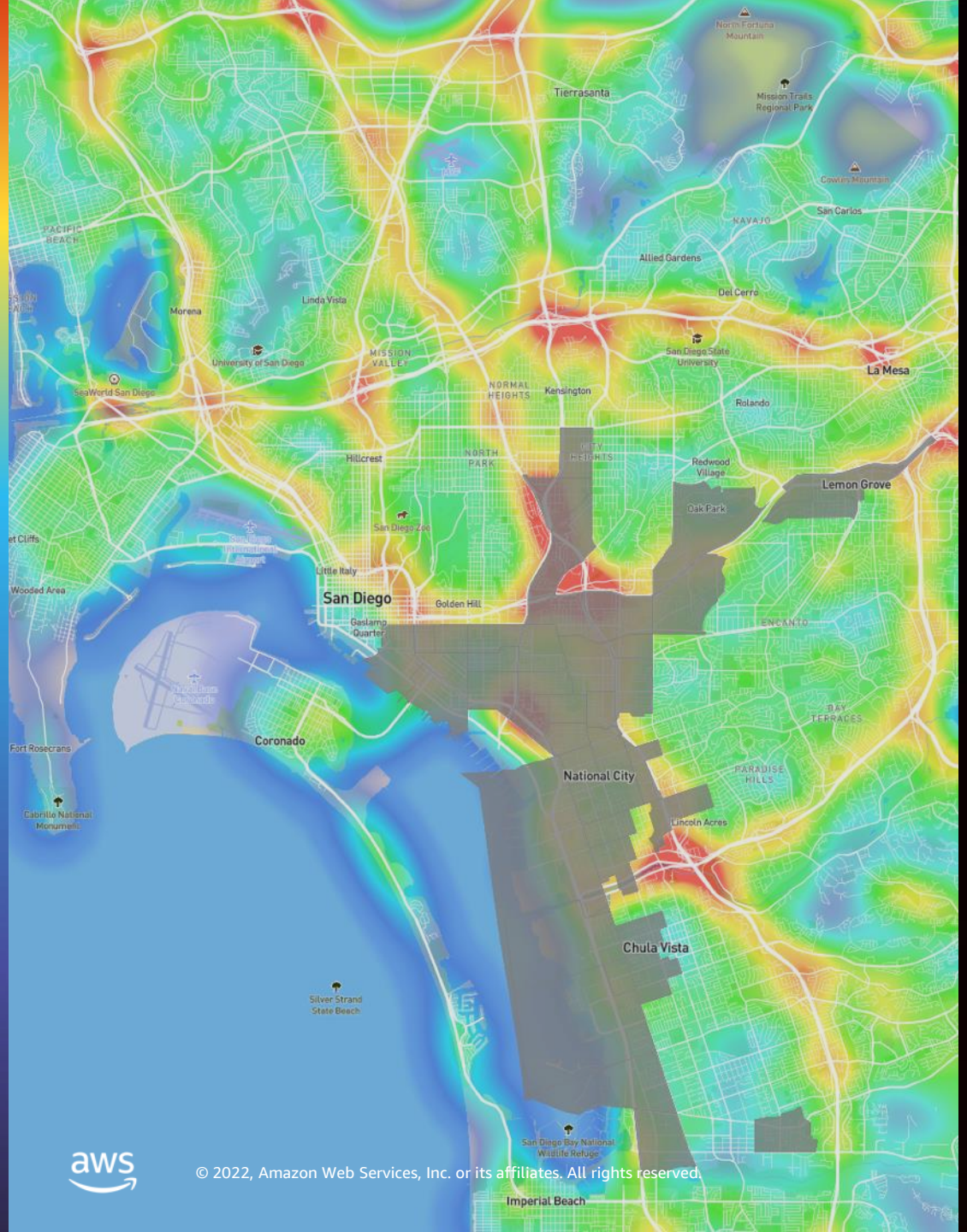
Combining internal and external data with advanced analytics to recognize patterns, derive insights, and provide the context for prioritizing equity across our communities

Focusing outreach to elevate awareness and propose change

Educating and engaging customers, policy makers, and the community around topics of equity, the impacts of climate change on our system, and how we're prioritizing rate reform and affordability



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Creating the right context

1 **Visualize internal and external sources of data**
Combine internal data sources with environmental, socioeconomic, and other publicly available data sources for data visualization

2 **Rapidly generate micro-insights with simple analytics**
Utilizing a cloud-based visualization layer that can spin up in minutes and scale indefinitely

3 **Focus on optimization modeling**
Use cloud-based advanced analytics capabilities to target specific company actions and investments

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Fleet decarbonization

How might we **design our fleet transition to maximize our positive impact on underserved communities** through informed decision-making?



Decarbonize fleet vehicles



Roll out EV fleet infrastructure

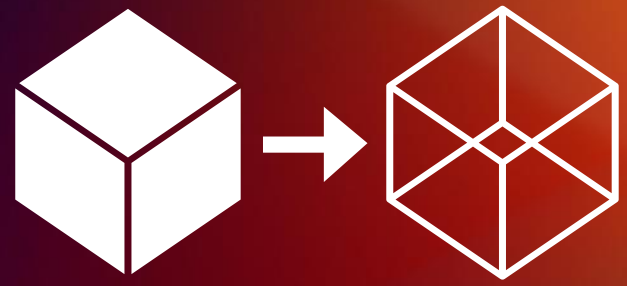


Support underserved communities

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Digital twin

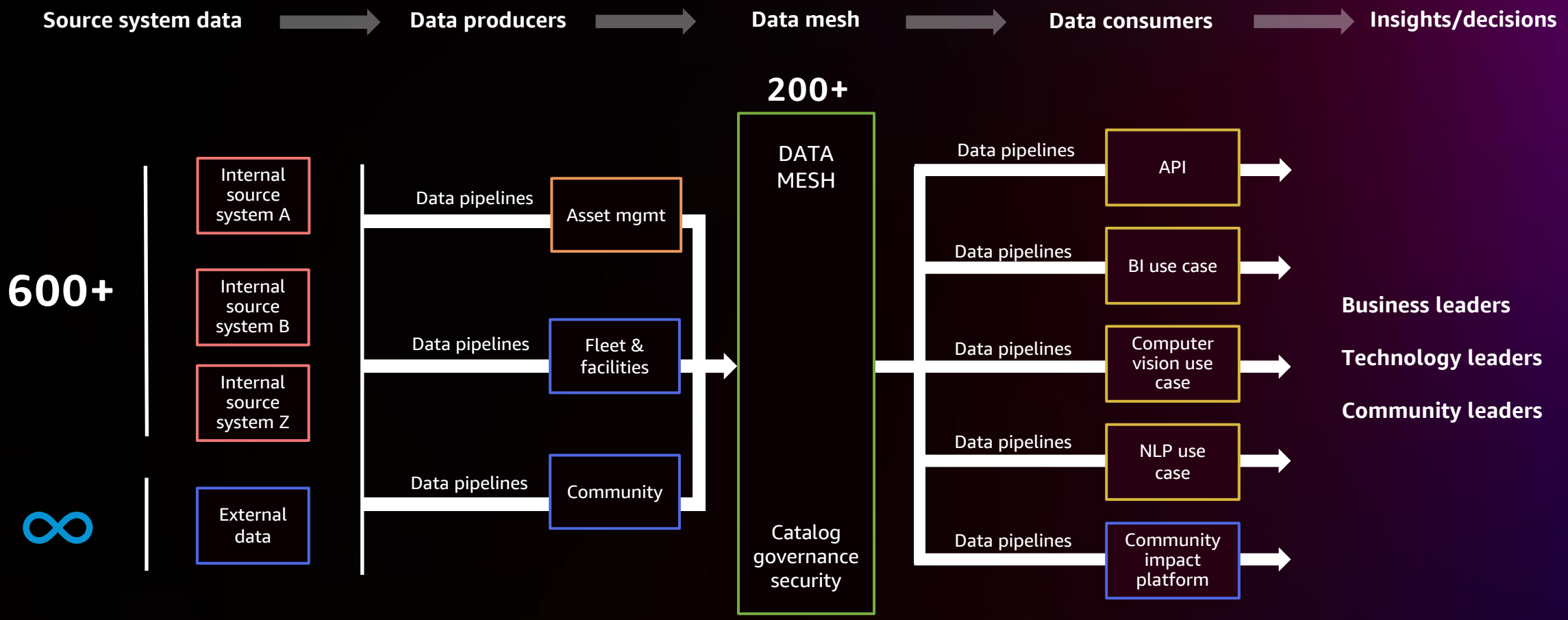
Intersection of design, data, and predictive and prescriptive analytics



A digital twin combines a **visual representation of an asset with statistics and machine learning algorithms** to **monitor performance**, **predict potential outcomes** for modeled scenarios, and **recommend actions** that yield **optimum** outcomes

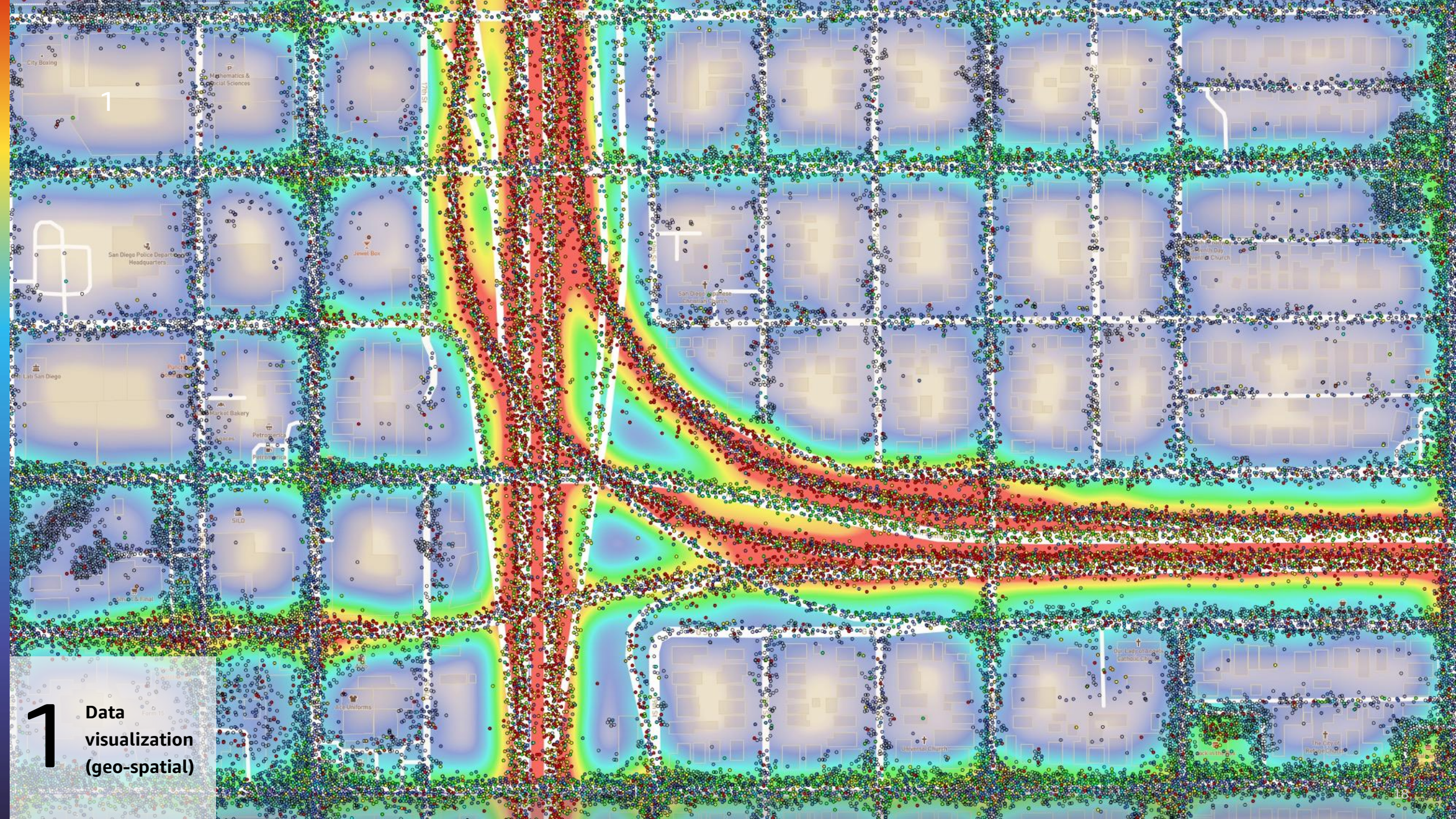
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Starting with data

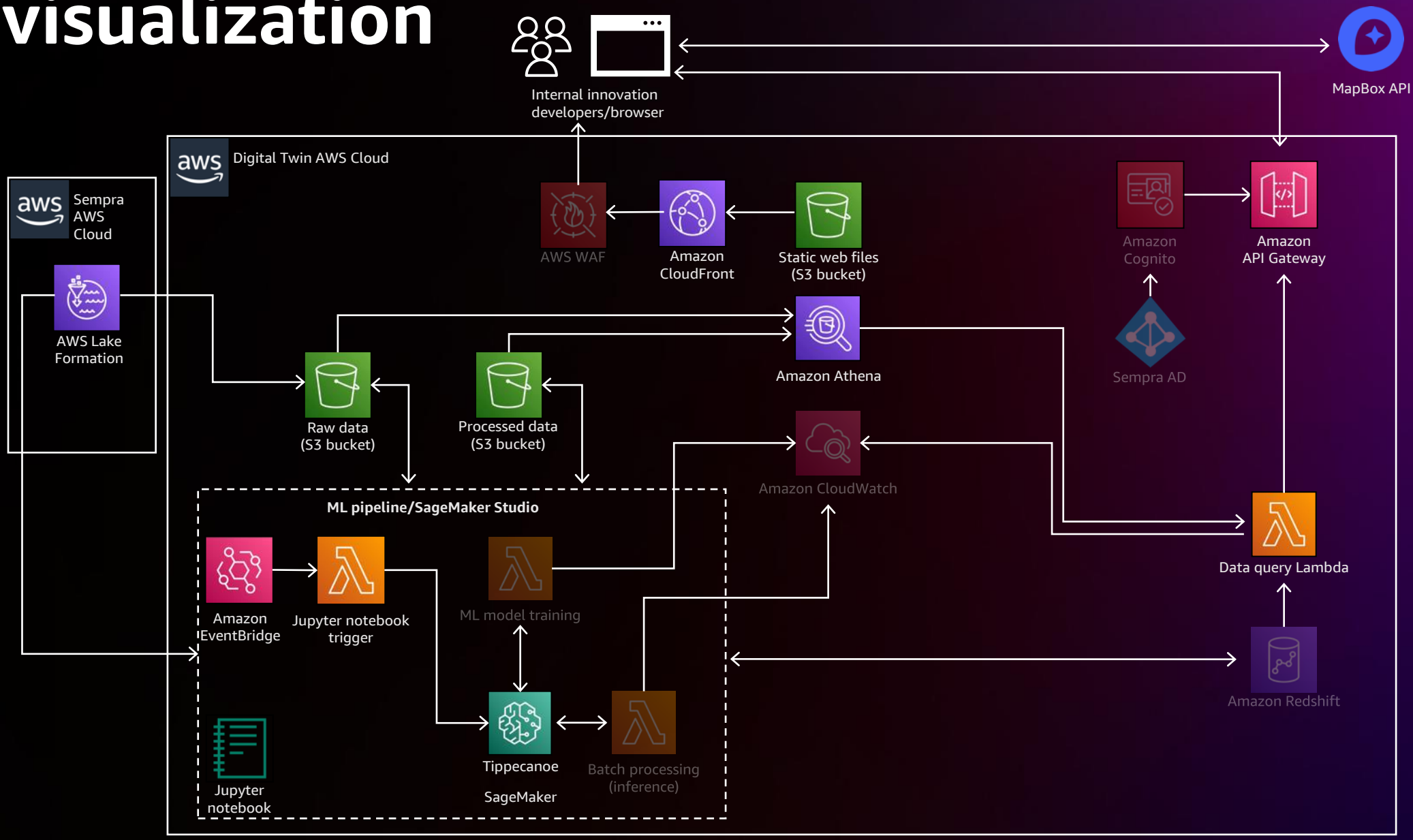


Integrate once, consume indefinitely

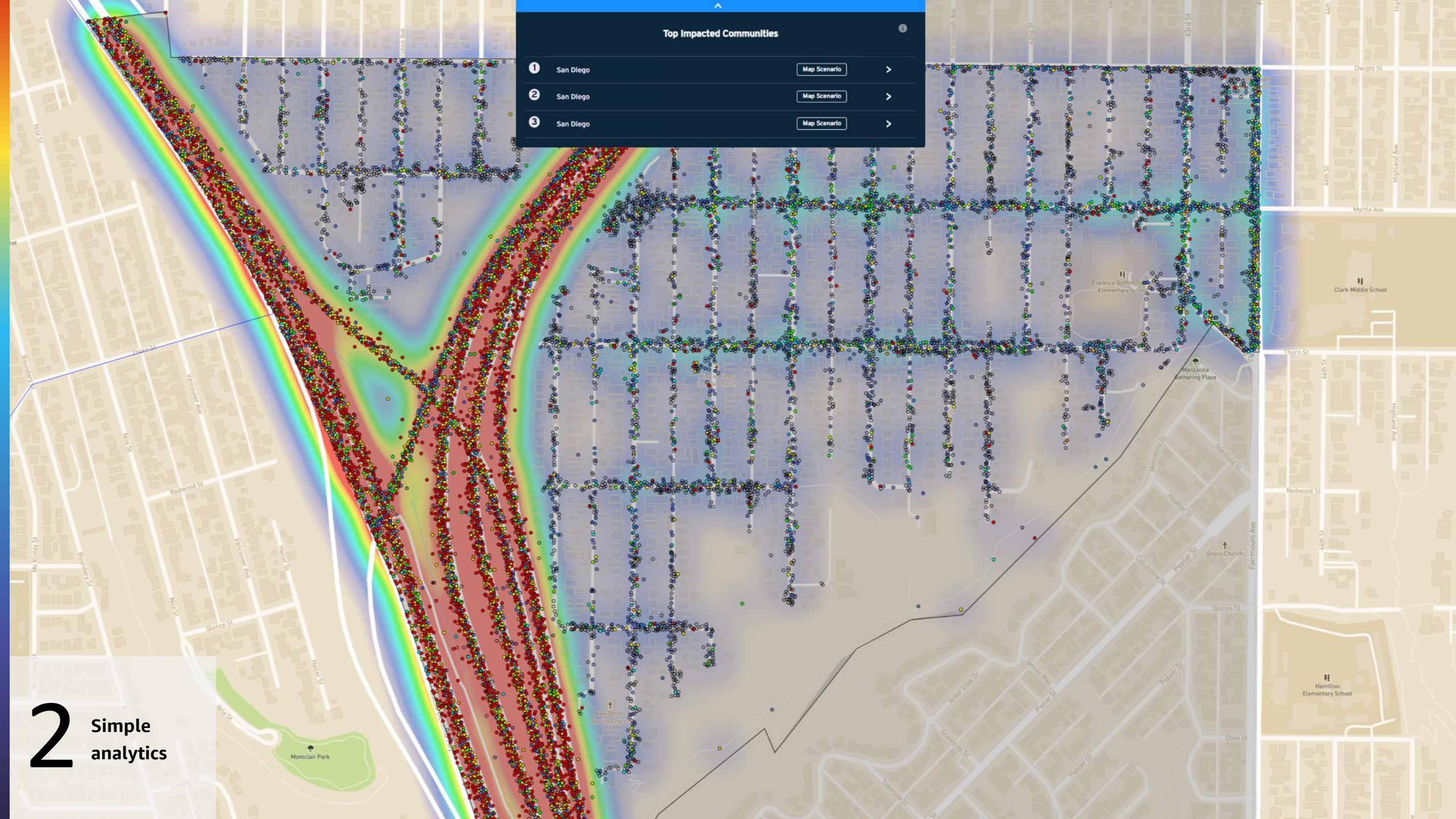
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1
Data visualization (geo-spatial)

Data visualization

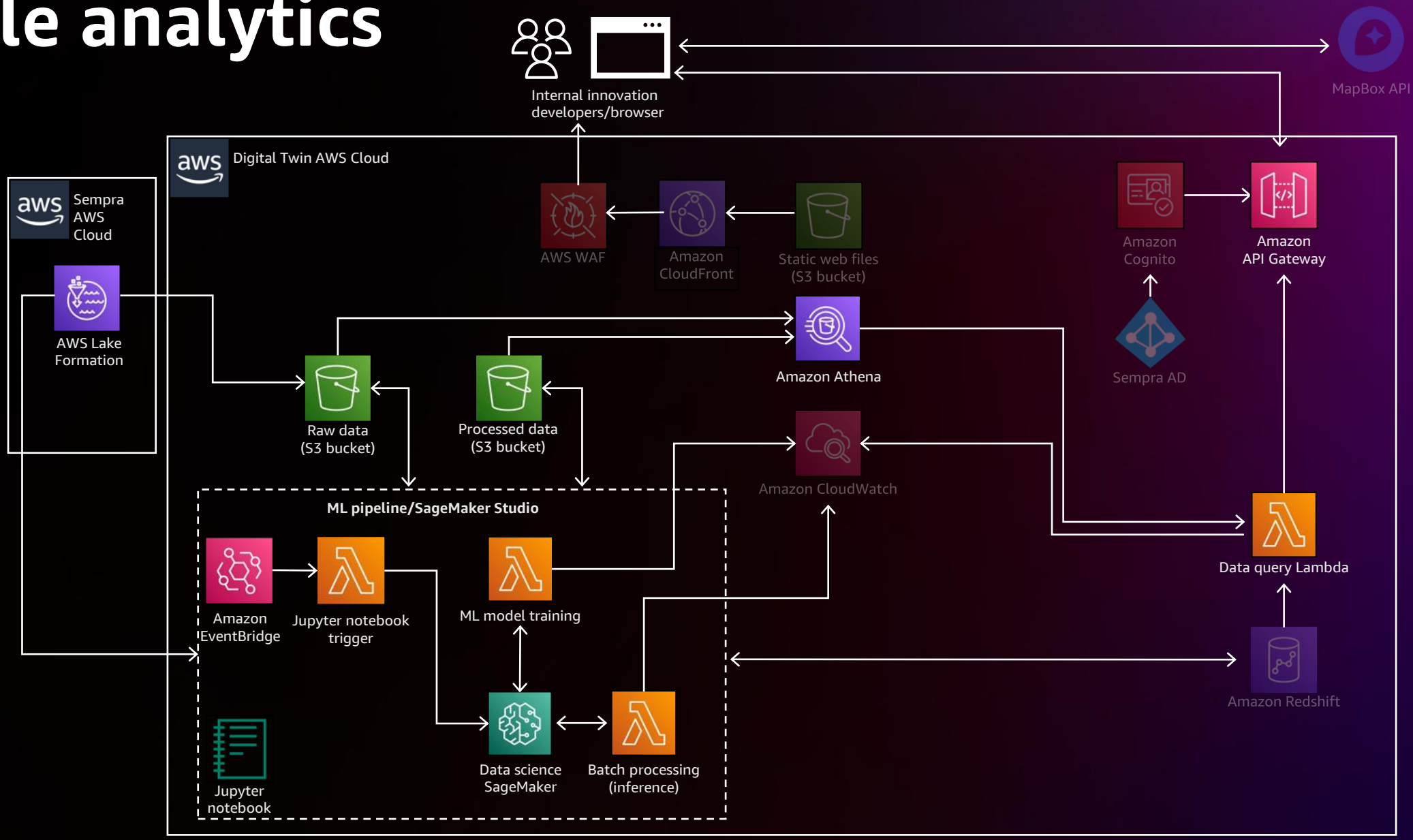


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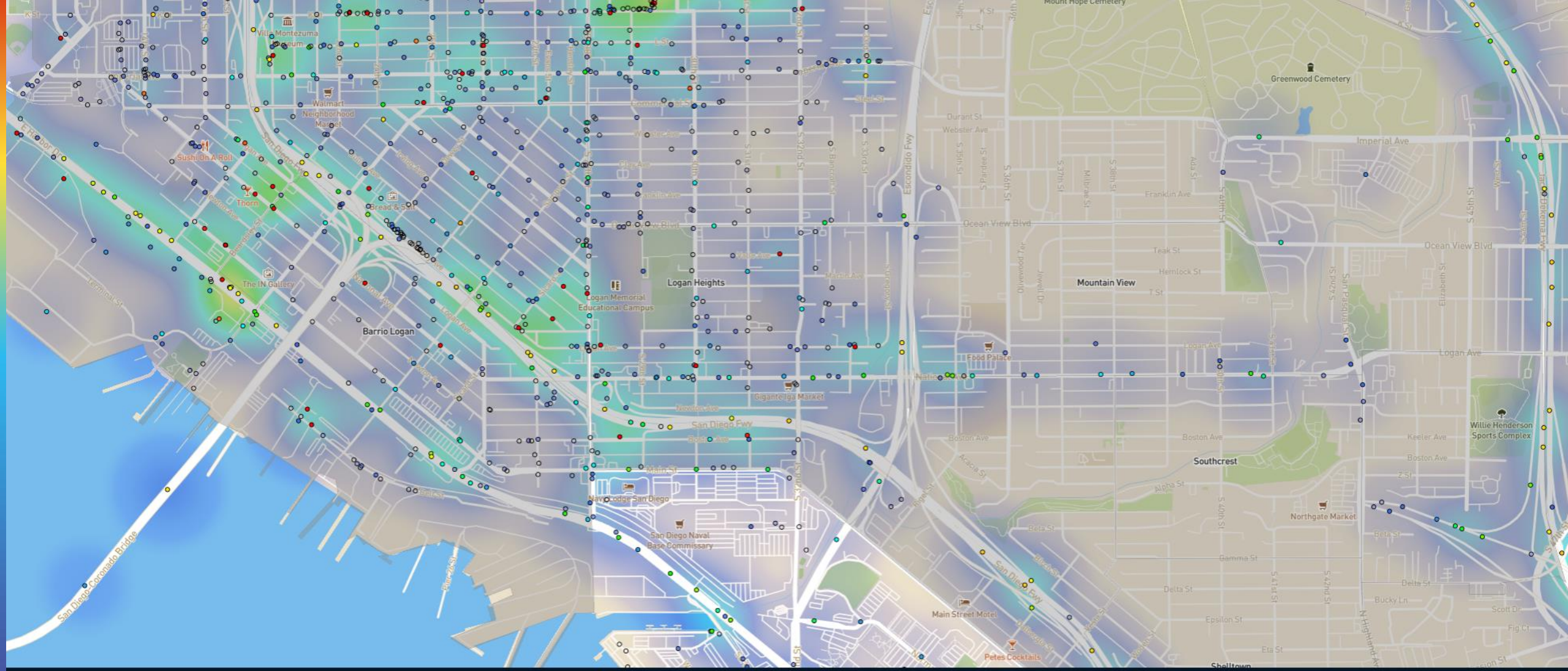


2 **Simple analytics**

Simple analytics



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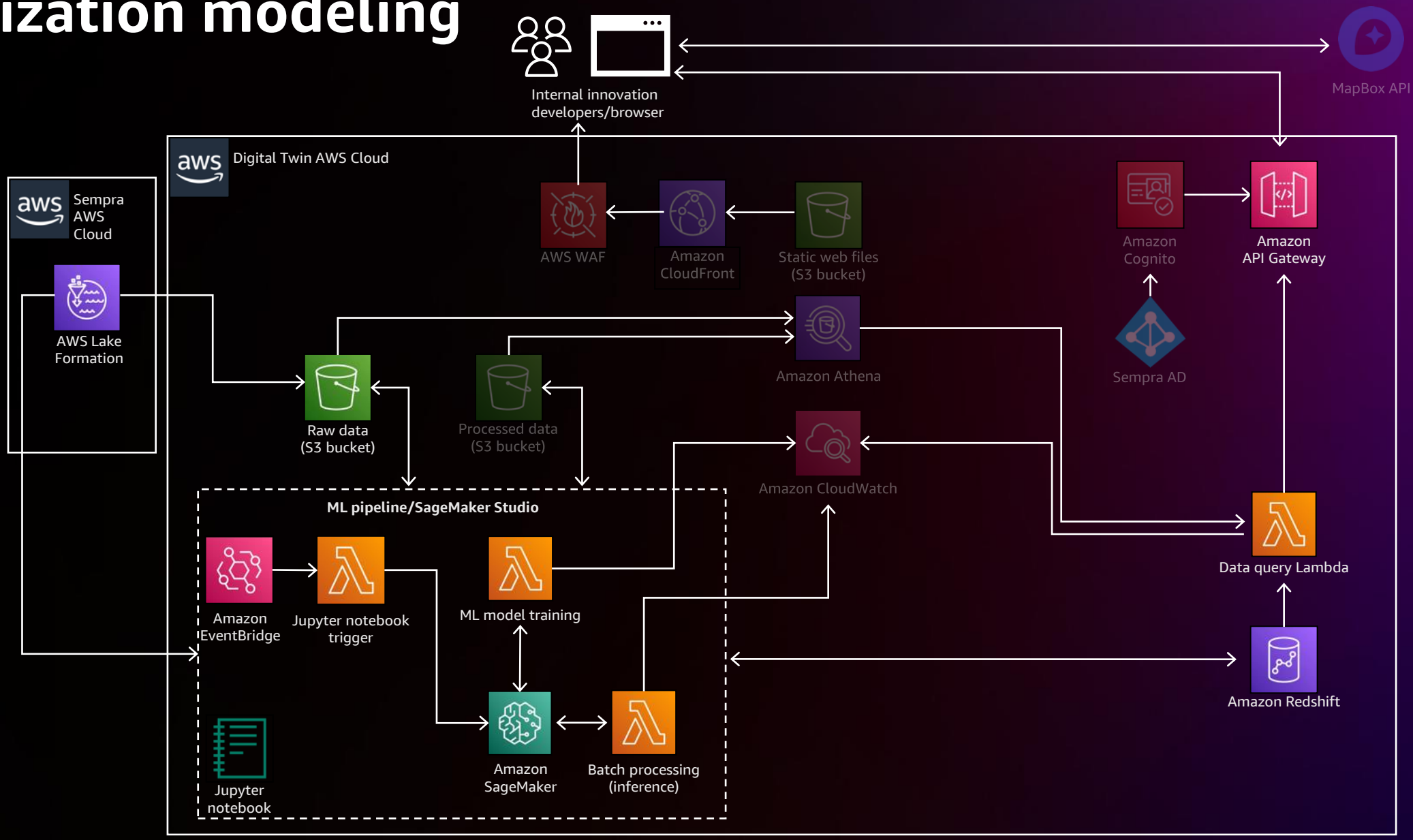
Vehicle Replacement | Vehicle Swapping

3 Optimization modeling

Showing emissions in Pounds

Ranking	Vehicle	DAC CO2 Emissions	Total CO2 Emissions
1		43,486	68,033

Optimization modeling



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Prioritizing equity and maximizing system value



Carbon neutrality

Enable new community impact insights to accelerate the transition to carbon neutrality and achieve net zero by 2035

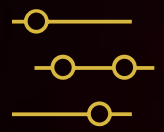
- Fleet decarbonization
- Facilities decarbonization
- Carbon intensity and management



Electrification

Help reduce air pollution in vulnerable communities by expanding electrification

- Public charging/ refueling stations
- Transportation corridors
- Transportation hubs



Reliability

Inform system modernization efforts for a clean and safe infrastructure with a focus on equity

- Smart distribution
- Microgrids
- 4 kV modernization



Climate adaptation

Address the impacts of climate change by evolving our services and operations

- Climate hazards
- Sea level rise/ coastal flooding
- Extreme weather events

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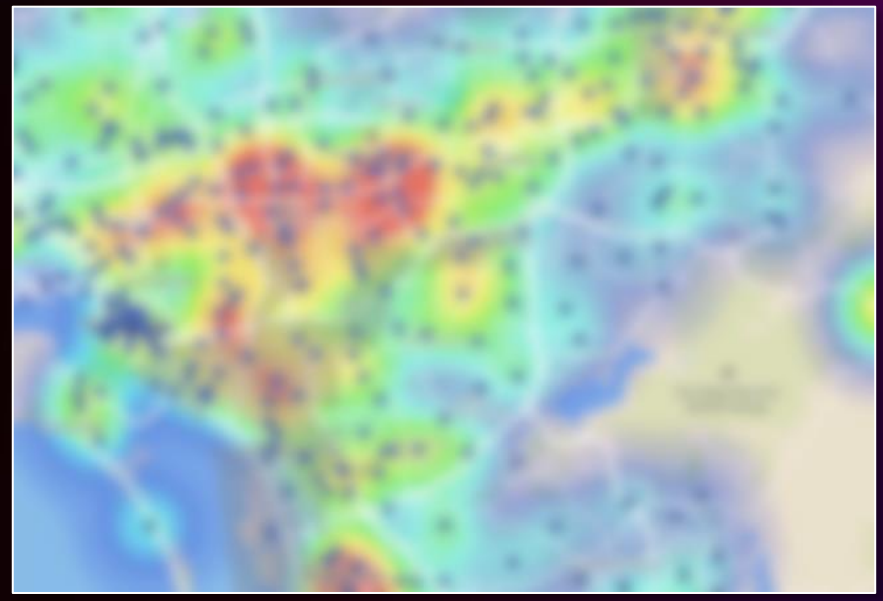
Prioritizing through optimization modeling

COMMUNITY RELATIONS – GIVING DATA



"Which communities should receive charitable contributions next based on our giving pillars and equity?"

CIRCUIT RELIABILITY – OUTAGE DATA

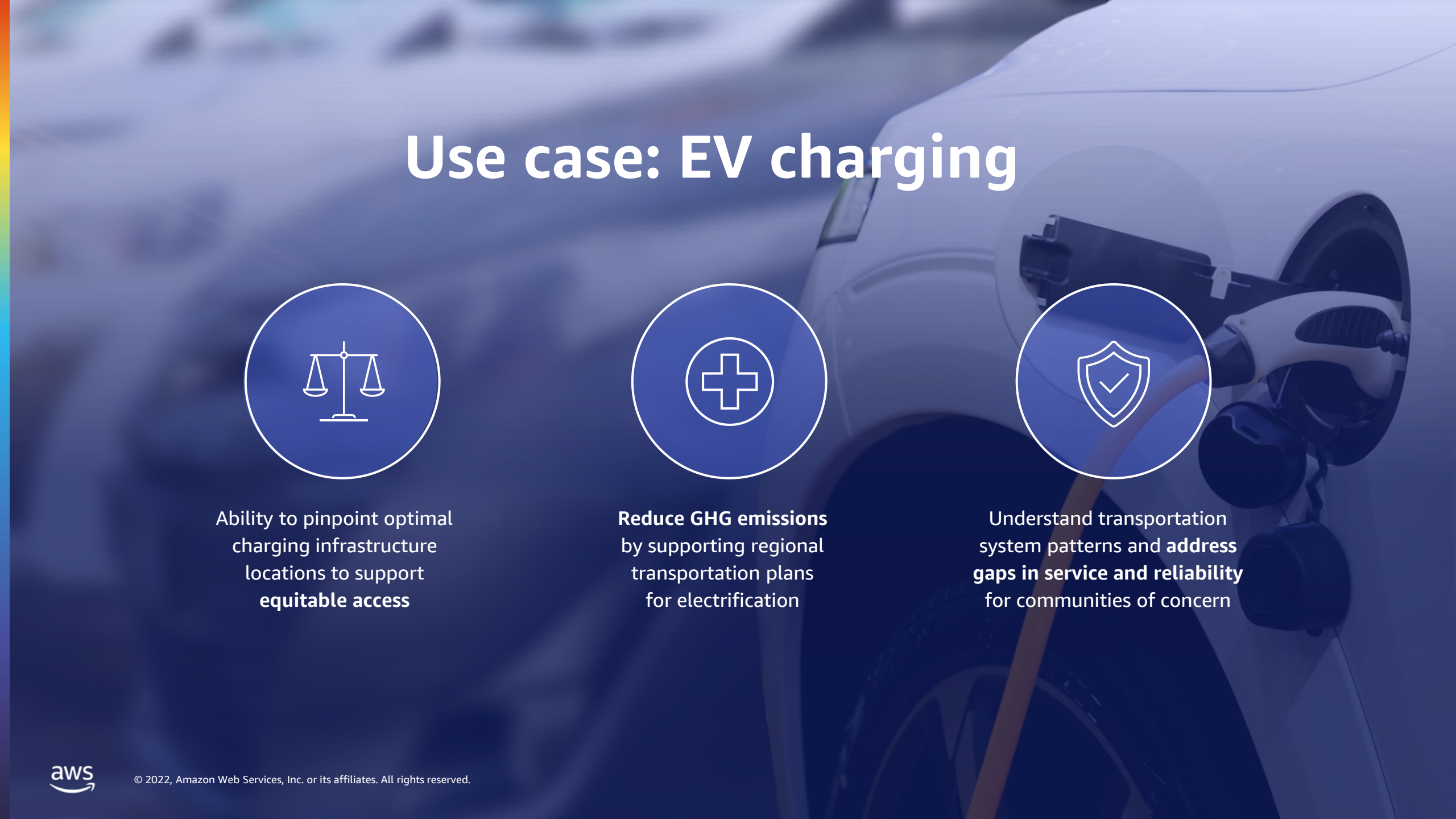


"Which communities should receive infrastructure modernization investments to increase reliability equity?"

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Use case: EV charging



Ability to pinpoint optimal charging infrastructure locations to support **equitable access**

Reduce GHG emissions by supporting regional transportation plans for electrification

Understand transportation system patterns and **address gaps in service and reliability** for communities of concern

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System value framework



GHG emissions



Air quality and health



Reliability and service quality



Equitable access



Jobs and economic impact



Water health



System efficiency



Resiliency and security



System upgrade



Foreign direct investment



Flexibility



Cost and investment

Potential system value outcomes to prioritize/quantify

Source: The World Economic Forum System Value Framework

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The imperatives to make progress today



Decarbonizing customer energy usage for a sustainable future



Decentralization with the rise of new energy sources



Digitalization of data streams to efficiently manage production and consumption

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Thank you

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