



PUBLIC SECTOR
SUMMIT ONLINE

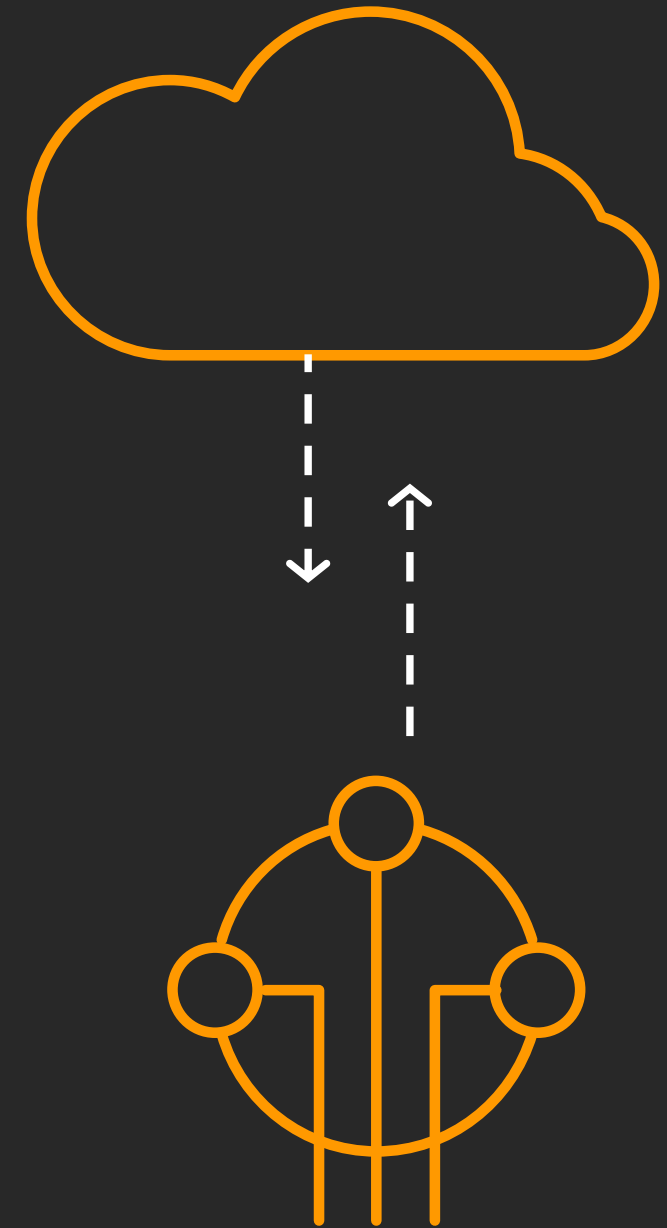
Using the cloud to build a smart cities vision powered by AWS

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Snr. IoT Specialist Solutions Architect

Agenda

1. Smart Cities- **Possibilities**
2. Smart City **Segments**
 1. Transport
 2. Utilities
 3. Citizens Services
 4. Smart Buildings
3. Making an impact in **Covid times**
4. Telling our **Story**
5. Key **Takeaways**



Being SMART



Data Sensing and Metering

Realtime Data Integration + Historical data

Data Modelling, Analytics, Machine Learning

Visualization - Single Pane of Glass – Insights & Decision Support

IF YOU KNEW THE STATE OF EVERYTHING, WHAT PROBLEMS WOULD YOU SOLVE?

TRANSPORTATION: CITIES TRANSFORMED BY THE CLOUD

SAFETY: YOUR CITY, A SAFER COMMUNITY

HEALTHCARE: THE POWER TO HEAL YOUR CITY

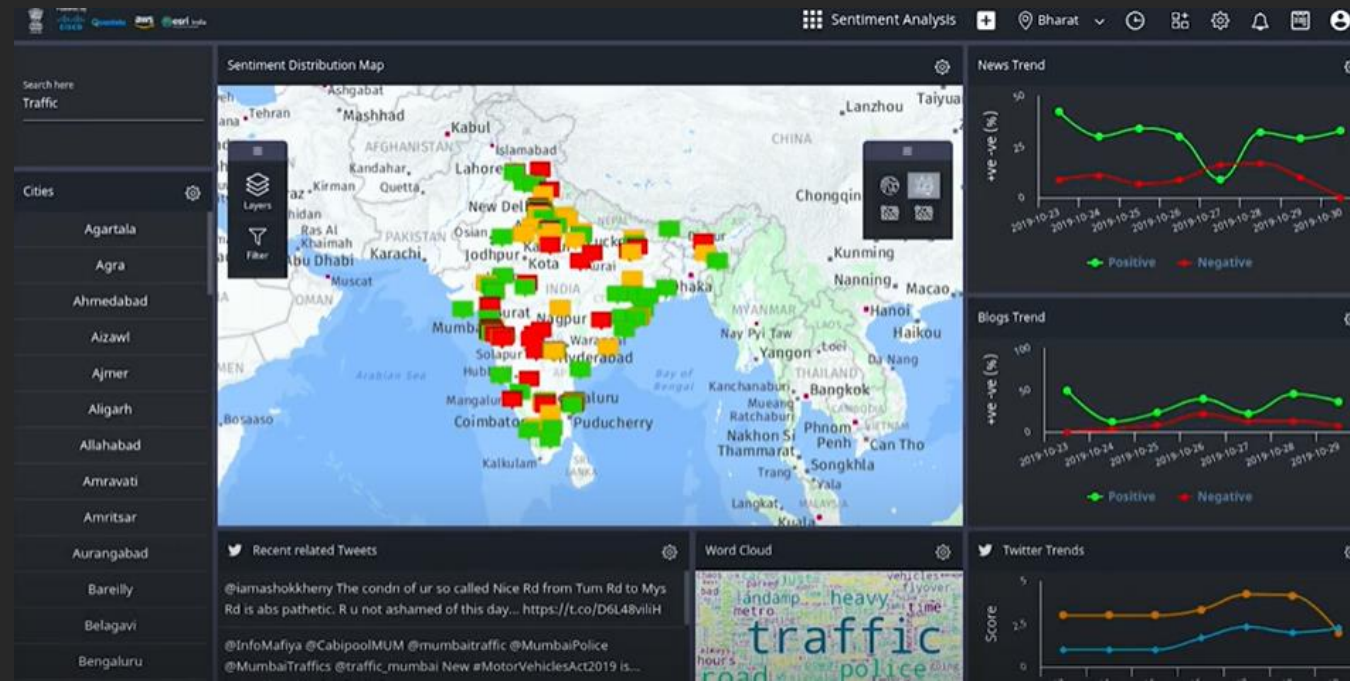
ENVIRONMENT : FOR THE GENERATIONS TO COME

QUALITY OF LIFE: YOUR CITY, UNIQUE AND THRIVING

OPEN DATA: BRING TRANSPARENCY TO YOUR CITY



Ministry of Housing & Urban Affairs Integrates Data from 100+ cities on AWS



Challenge

The Smart Cities Mission wanted to set up a state-of-the-art India Urban Observatory to plug into the myriad sources of data from cities, both from real-time and archival sources

Solution

The organization chose to host the solution on AWS Cloud. The platform enables seamless integration of data coming from a variety of solutions and different environments including solutions hosted on-premise.

Benefits

The time taken from idea to execution was 5 weeks.
Scalable platform moving from 500 data sets to 500,000 data sets.

“

India Urban Observatory, which is meant to enable data driven governance, leverages AWS cloud platform, simplifying solution integration from multiple partners, for 100+ cities across the country.

”

Kunal Kumar, Mission Director – Smart Cities Mission, Ministry of Housing & Urban Affairs



THE TECHNOLOGY TRAILBLAZERS!

SINGAPORE

The Land Transport Authority of Singapore is using AWS to satisfy the travel demands of 2.2 million users each day.

TSUKUBA CITY

Home to numerous research institutions, Tsukuba City in Japan is supporting real-world testing of the latest technology, focused around the UN's Sustainable Development Goals.

PARIS

Rail operator SNCF is migrating applications to the cloud to accelerate digital transformation and keep commuters across Europe on track.

CHICAGO

The City of Chicago deployed a real-time, open source, situational awareness program to improve the efficiency of city operations and ultimately the quality of life for citizens.



Smart City Value Chain



AWS Breadth and Depth of Services

ANALYTICS

ANALYTICS
DATA EXCHANGE
DATA LAKE
DATA PIPELINES
DATA WAREHOUSE
ELASTICSEARCH

STREAMING
ETL
HADOOP/SPARK
INTERACTIVE SQL QUERIES
VISUALIZATIONS

AR + VR

AR/VR EXPERIENCES

AWS COST MANAGEMENT

ANALYZE AWS COSTS
COST & USAGE BUDGETS
COST & USAGE REPORTS
RESERVED INSTANCES REPORTING

APPLICATION INTEGRATION

EMAIL
MESSAGE BROKER
QUEUEING & NOTIFICATIONS

SEARCH
TRANSCODING
WORKFLOW

BUSINESS APPLICATIONS

EMAIL & CALENDARING
ONLINE MEETINGS
SHARING & COLLABORATION

UNIFIED COMMUNICATIONS
VOICE-ENABLED WORKPLACE

BLOCKCHAIN

BLOCKCHAIN TEMPLATES
LEDGER DATABASE
MANAGED BLOCKCHAIN

CUSTOMER ENGAGEMENT

CONTACT CENTER
EMAIL TARGETING
USER ENGAGEMENT ACROSS CHANNELS

COMPUTE

COMPUTE
AUTO SCALING
BATCH JOBS
EVENT-DRIVEN SERVERLESS COMPUTING
INSTANCE TYPES
MANAGED VIRTUAL PRIVATE SERVERS
MANAGED REPOSITORY FOR SERVERLESS APPS
RUN & MANAGE WEB APPS
SERVERLESS COMPUTE
VIRTUAL SERVERS

CONTAINERS
CONTAINER SERVICE
MANAGED KUBERNETES
STORE & RETRIEVE DOCKER IMAGES

DATABASE

REALTIONAL DATABASES
HIGH-PERFORMANCE RELATIONAL DATABASE BUILT FOR THE CLOUD
MANAGED MARIADB
MANAGED MYSQL
MANAGED ORACLE
MANAGED POSTGRESQL
MANAGED SQL SERVER

PURPOSE-BUILT DATABASES
DOCUMENT DATABASE
GRAPH DATABASE
IN-MEMORY CACHING
KEY-VALUE STORE DATABASE
LEDGER DATABASE
TIME SERIES DATABASE

DEVELOPER TOOLS

ANALYZE & DEBUG
APPLICATION LIFECYCLE MANAGEMENT
AUTHORING
BUILD & TEST
CONTAINERS
DEVOPS RESOURCE MANAGEMENT
ONE-CLICK APP DEVELOPMENT
PATCHING
PIPELINE ORCHESTRATION
RESOURCE TEMPLATES
TRIGGERS

END USER COMPUTING

APP STREAMING
DESKTOP COMPUTING

MOBILE ACCESS
STORAGE & COLLABORATION

HYBRID ARCHITECTURE

AWS SERVICES ON PREMISES
DATA INTEGRATION
INTEGRATED DEVICES & EDGE SYSTEMS
INTEGRATED IDENTITY & ACCESS

INTEGRATED NETWORKING
INTEGRATED RESOURCE & DEPLOYMENT MANAGEMENT
VMWARE CLOUD ON AWS

GAME TECH

CROSS-PLATFORM 3D GAME ENGINE
GAME SERVER HOSTING

INFRASTRUCTURE

AVAILABILITY ZONES
CUSTOM HARDWARE
DATA CENTER INFRASTRUCTURE
GLOBAL NETWORK BACKBONE
POINTS OF PRESENCE
POWER INFRASTRUCTURE
REGIONS

INTERNET OF THINGS (IOT)

RULES ENGINE
DEVICE ANALYTICS
DEVICE GATEWAY
DEVICE SDK
DEVICE SHADOWS
EVENT DETECTION & RESPONSE
LOCAL COMPUTE
LOCAL DATA COLLECTION MANAGEMENT & SECURITY
MICROCONTROLLER OPERATING SYSTEM
REGISTRY
VISUAL APPLICATIONS DEVELOPMENT

MACHINE LEARNING

ML FRAMEWORKS
DEEP LEARNING AMIs & CONTAINERS
HARDWARE ACCELERATION
ML AT THE EDGE
TENSORFLOW, PYTORCH, MXNET

SAGEMAKER
AUTOMATIC MODEL TUNING
DATA LABELING
HOSTED NOTEBOOKS
ML MARKETPLACE
MODEL HOSTING
MODEL OPTIMIZATION
MODEL TRAINING
PRE-BUILT ALGORITHMS
TOPIC MODELING
DEEP LEARNING MODELS
REINFORCEMENT LEARNING
SPOT INSTANCES
BATCH PREDICTIONS
REAL-TIME PREDICTIONS

AI SERVICES
CHATBOTS
ENTITY EXTRACTION
FACE ANALYTICS
FACE SEARCH
FORECASTING
IMAGE LABELING
NATURAL LANGUAGE PROCESSING
PERSONALIZATION & RECOMMENDATION
SENTIMENT ANALYSIS
SPEECH TRANSCRIPTION
TEXT & DATA EXTRACTION
TEXT TO SPEECH
TRANSLATION
VIDEO & IMAGE ANALYSIS
CONTENT MODERATION

MANAGEMENT & GOVERNANCE

ACTIVITY & API USAGE TRACKING
CHATBOT
CONFIGURATION TRACKING
GOVERNANCE
INVENTORY TRACKING
LICENSE MANAGER
MANAGE POLICIES
MANAGE RESOURCES

MONITORING
PROVISIONING
RESOURCE TEMPLATES
SECURITY RECOMMENDATIONS
SERVER MANAGEMENT
SERVICE CATALOG
SYSTEMS MANAGER

MARKETPLACE

ANALYTICS
DATA PRODUCTS
DATABASES
DEVOPS
IOT

MACHINE LEARNING
NETWORKING
OPERATING SYSTEMS
SECURITY
STORAGE

MEDIA SERVICES

LIVE VIDEO TRANSPORT
MEDIA STORAGE
TRANSCODING
VIDEO ORIGINATION & PACKAGING

VIDEO PERSONALIZATION & MONETIZATION
VIDEO PROCESSING & DELIVERY
VIDEO STREAMING ANALYSIS

MIGRATION & TRANSFER

APPLICATION MIGRATION
DATABASE MIGRATION
EXABYTE-SCALE MIGRATION
ONLINE DATA TRANSFER
SCHEMA CONVERSION
SERVER MIGRATION
TRANSFER FOR SFTP

MOBILE

API GATEWAY
DEVELOPMENT FRAMEWORK
IDENTITY
MOBILE ANALYTICS

MOBILE APP TESTING
SINGLE INTEGRATED CONSOLE
SYNC
TARGETED PUSH NOTIFICATIONS

NETWORKING & CONTENT DELIVERY

APPLICATION DELIVERY
DEDICATED NETWORK CONNECTION
DOMAIN NAME SYSTEM
LOAD BALANCING
MONITOR APIS
MONITOR MICROSERVICES
NETWORK TOPOLOGY
NETWORKING HUB
PRIVATE CONNECTION TO APPS
SCALE VPC & ACCOUNT CONNECTIONS
SERVICE DISCOVERY
VIRTUAL PRIVATE CLOUD

ROBOTICS

CLOUD ROBOTICS

SATELLITE

SATELLITE OPERATIONS

SECURITY, IDENTITY, & COMPLIANCE

ACCESS CONTROL
ASSESSMENT & REPORTING
CONFIGURATION COMPLIANCE
DATA PROTECTION
DDOS PROTECTION
IDENTITY MANAGEMENT
KEY MANAGEMENT & STORAGE
MONITORING & LOGGING
RESOURCE MANAGEMENT
THREAT DETECTION
WEB APPLICATION FIREWALL

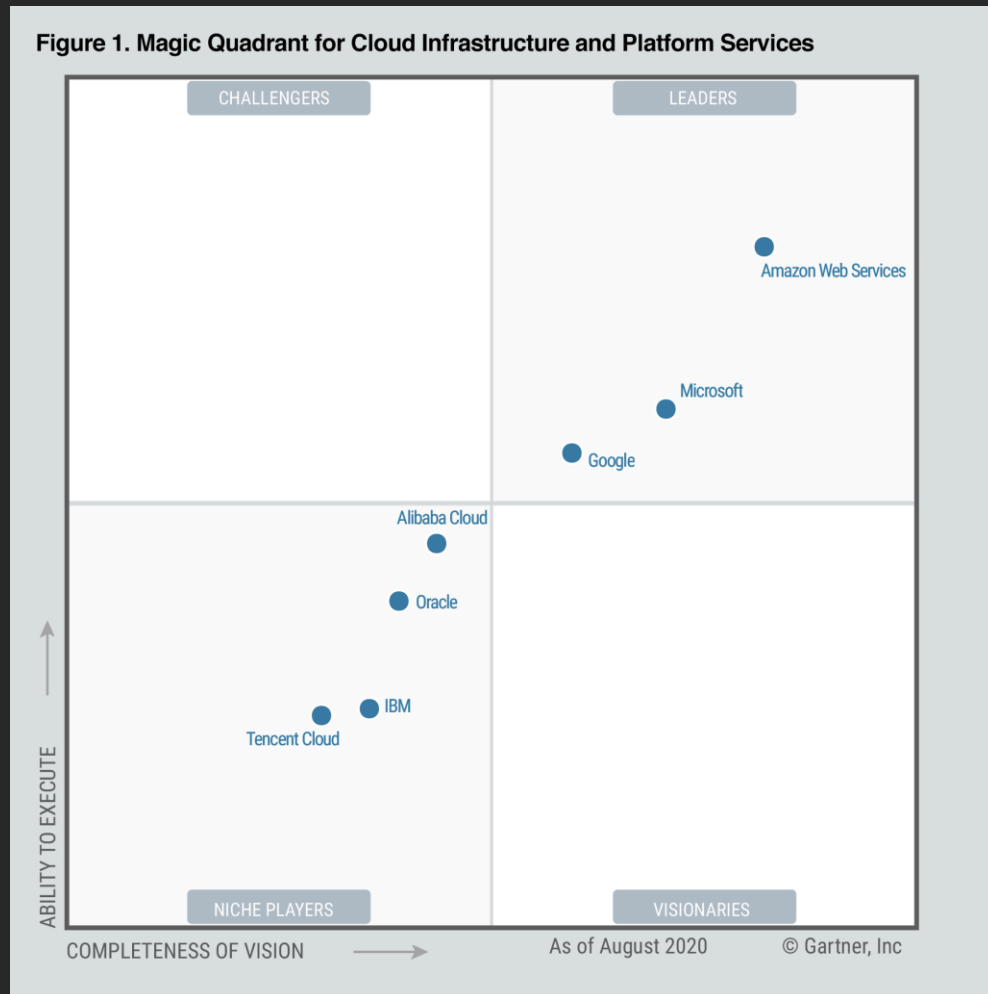
STORAGE

ARCHIVE STORAGE
BACKUP & RESTORE
BLOCK STORAGE
DATA TRANSFER
EDGE PROCESSING & COMPUTING
FILE STORAGE
HIGH-PERFORMANCE FILE SYSTEM
HYBRID CLOUD STORAGE
OBJECT STORAGE
WINDOWS FILE SYSTEM

CUSTOMER ENABLEMENT

ACCOUNT MANAGEMENT
DASHBOARD PERSONALIZATION
ENTERPRISE SUPPORT
EXPERTS MARKETPLACE
OPTIMIZATION GUIDANCE
PARTNER ECOSYSTEMS
PROFESSIONAL SERVICES
SECURITY & BILLING REPORTS
SOLUTIONS MANAGEMENT
TRAINING & CERTIFICATION

IDC MarketScape names AWS as a leader in IoT applications platforms for Smart Cities



AWS Recognized as a Cloud Leader
for the 10th Consecutive Year

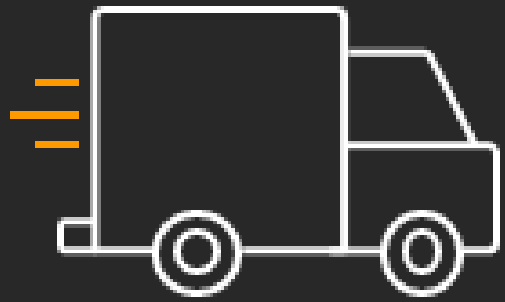
“Given the breadth of solutions and products offered and the interoperability with third-party developers and apps, AWS is a powerful platform for cities capable of handling this rapid pace of innovation and needed custom development work, and AWS offers relative ease for communities to scale for additional functionalities after initial deployment.

AWS offers a broad set of capabilities, solutions, and products for cities and is readily configurable to work other developers and firms building solutions on top of its platforms.”

- IDC Marketscape, *Worldwide IoT Applications Platforms for Smart Cities*, 2019-2020
<https://www.idc.com/getdoc.jsp?containerId=US43580918>

Smart City Segments

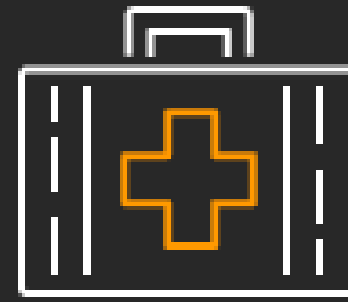
Smart City Segments



**Transportation &
mobility**



Safety



Healthcare



Quality of life

CITIES TRANSFORMED BY THE CLOUD

The AWS Cloud can help cities implement smart transportation systems that use data, applications, and technology to help people move more quickly, cheaply, and efficiently.

TRANSPORT FOR LONDON, UK

Open data now makes urban travel easier for London's millions of commuters. Sharing data spawned an ecosystem of 6,000+ third-party developers helping those in the capital get where they need to be.

NEW YORK CITY

Traffic and pedestrian safety initiatives in the cloud using crowd sourcing to collect traffic safety data, which can be used to redesign streets and traffic patterns

SOUTH AFRICA

An intelligent public transport system to better monitor and manage Public Transport.





THORN



**INVESTIGATIVE
TIME DECREASED
BY 65%**

SPOTLIGHT

Thorn helps law enforcement identify child sex-trafficking victims faster on AWS

21,000
**HUMAN
TRAFFICKING**
INVESTIGATIONS
ASSISTED BY AWS



**IDENTIFIED
18,000**
VICTIMS, INCLUDING OVER
6,000
CHILDREN

HEALTHCARE: **THE POWER TO HEAL YOUR CITY**

Cloud can help lower the cost of providing quality healthcare services to citizens. Always-on contact centre operations running on AWS provide faster service to callers and deliver accurate answers more consistently. Cloud solutions also help relieve advisors and provide a higher level of service at a lower cost to support a healthier, happier community.

HOW THE AWS CLOUD IS BENEFITING CITIZEN HEALTHCARE:

MEDISANTÉ

This Swiss-based firm expects five million devices to be exchanging patient data in the cloud within the next five years.

CANCER RESEARCH UK

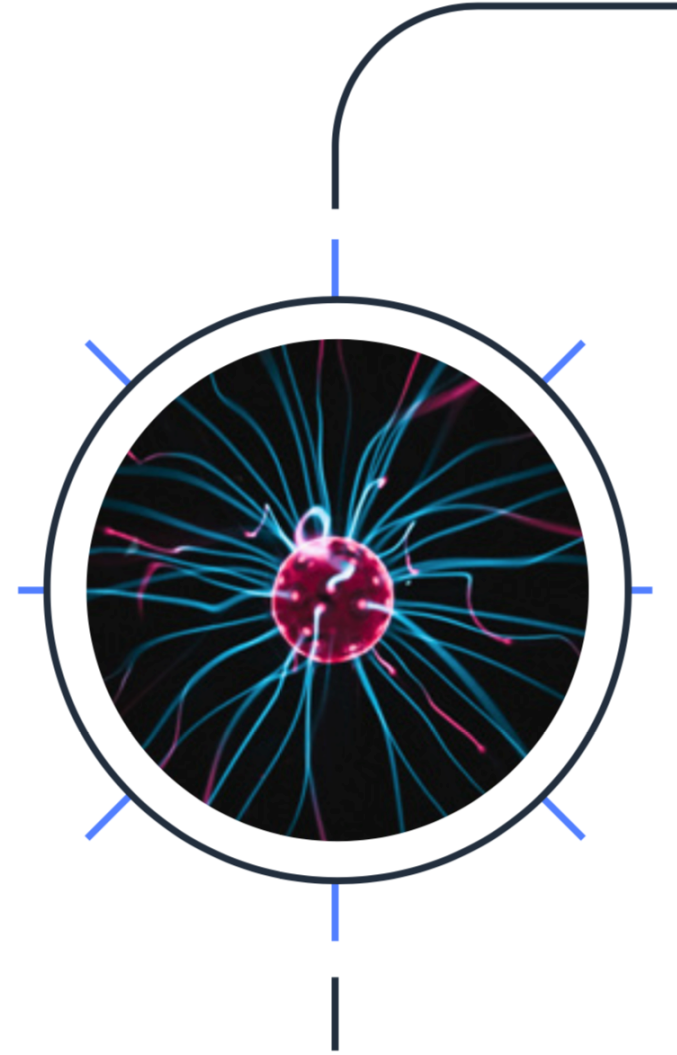
The world's largest independent cancer charity migrated to AWS and saved money that is now being used to save lives instead.

WEBEL

Leading on IT initiatives for the state government of West Bengal, India, Webel is building trusted public records using blockchain.

HEALTHDIRECT AUSTRALIA

Delivering services quickly across the entire country, including remote areas, while supporting 300 percent growth.



AbiBird Helps the Elderly Live Independently at Home



“We believe our technology running on AWS will allow the growing number of elderly people to live independently at home—where they are happier.”

Robin Mysell, CEO, ATF Services and AbiBird

**Wherever you are,
an automatic alert
from AbiBird will
let you know.**



Newport, Wales Deploys Innovative Smart City Technology in Weeks with IoT Platform from AWS Marketplace

CHALLENGE

Newport wanted to implement IoT proofs of concept to improve **flood control, waste management, and air quality**—without buying and managing costly server infrastructure.

SOLUTION

Working with **system integrator Pinacl**, Newport used the **Davra ConneCThing.io IoT platform** from AWS Marketplace to connect sensors and create a unified city dashboard.

BENEFITS

- Deployment in weeks instead of months.
- Ability to start with just a few sensors and scale up as needed
- Freedom to experiment at low cost and risk

“

Pinacl presented a smart city solution with the Davra ConneCThing.io platform from AWS Marketplace in record time. We were able to complete a full evaluation ahead of schedule and quickly see our smart city initiative, the Newport Intelligence Hub, coming to light. ”

Shaun Powell, Digital Lead, Newport City Council



Company: Newport City Council
Industry: Government
Country: Wales, UK
Councilors: 50
Website: www.newport.gov.uk

About Newport

Newport is a vibrant city of more than 300,000 in Wales, UK, seeking to invigorate its economy and improve quality of life for citizens and visitors using forward-thinking technology.



*e***WATER**

INNOVATION FOR LIFE

Covid-19 Response in India



Telangana State Government –The India National Association of Software and Service Companies (NASSCOM), deployed a secured data lake **within 5 days** to scale to thousands of data points in real-time. The solution has **100 dashboards** using anonymized government and public datasets. The India Vulnerability Map produces a holistic view of the pandemic from over 10 models on anonymized mobility data at district-level.

The India **eGovernments Foundation** develop an e-Pass solution **within 72 hours** to provide a digital pass management system that allowed inter -State Governments movement of essential service providers across and within states. to date over **50,000 organizations** and more than 600,000 daily passes have been issued.

Dr. Sarath Guttikunda, director and co-founder of [Urban Emissions](#), accesses data from the OpenAQ platform on AWS to gain insights correlating the impact of COVID-19 to the emission of [PM2.5 a major pollutant in India's capital area Delhi](#) during the nationwide lockdown. Guttikunda explains the policy relevance of this work and its reliance on open data – **“We can start to statistically ascertain the true background pollution of a city, in the absence of most of the personal, commercial, and industrial activities.”**

Smart Healthcare for the “New Normal”

[1st Group](#) an Australian Stock Exchange Listed digital healthcare platform, makes the appointment booking process easier and more effective through a cloud-based booking capability that **connects more than 11 million patients** to Pharmacies, Private Practices, Radiology, Vets, Corporate, and Government agencies **across 11,000 locations**.

[BigMate](#) a pre-screening tool used to identify temperatures amongst people coming to work. It streamlines testing process and reduce risk to allow businesses to operate. Using thermal camera technology Enterprise and Government can monitor temperatures across crowds + moving audiences, by leveraging AWS on the Edge. This **combines computer vision, IOT and AI/ML** to monitor temperatures.

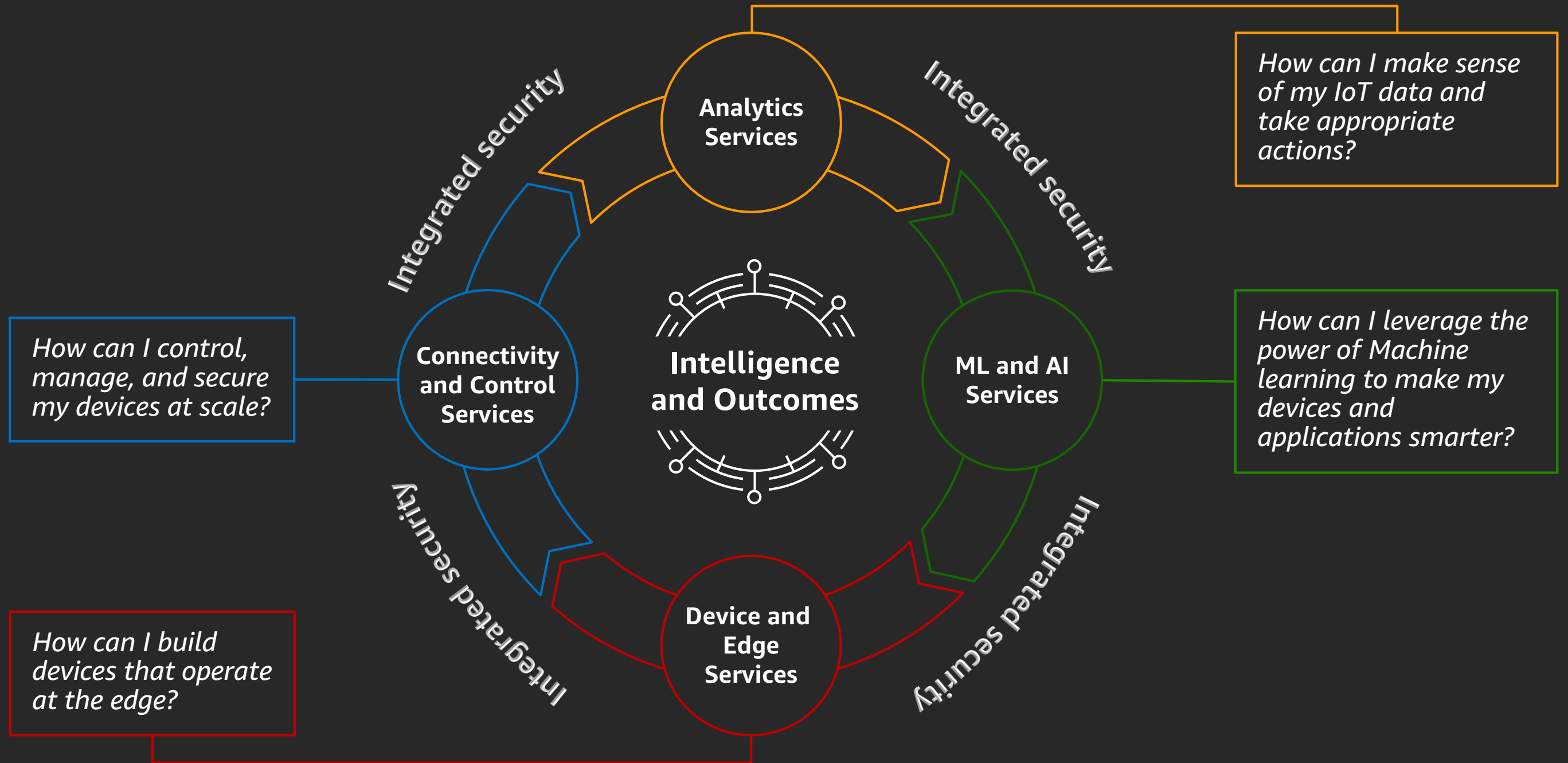
[Elenium Automation](#) developed touchless health screening, used at airports, medical centers and hospitals. The technology can be integrated into existing airport kiosks and bag drops, or installed as a desktop system at a passenger processing point such as an immigration desk. Using advanced sensors, the touchless screening **uses voice recognition and head movement detection** to monitor and analyze vital health signs in order to detect symptoms of possible illnesses such as COVID-19.

New Zealand’s [Orion Health](#) develops software to improve healthcare outcomes for more than **100 million patients**, developed a pandemic monitoring platform to help providers identify and curate lists of patients both COVID-19 negative and positive who would benefit from active monitoring or care and tracking their ongoing progress.

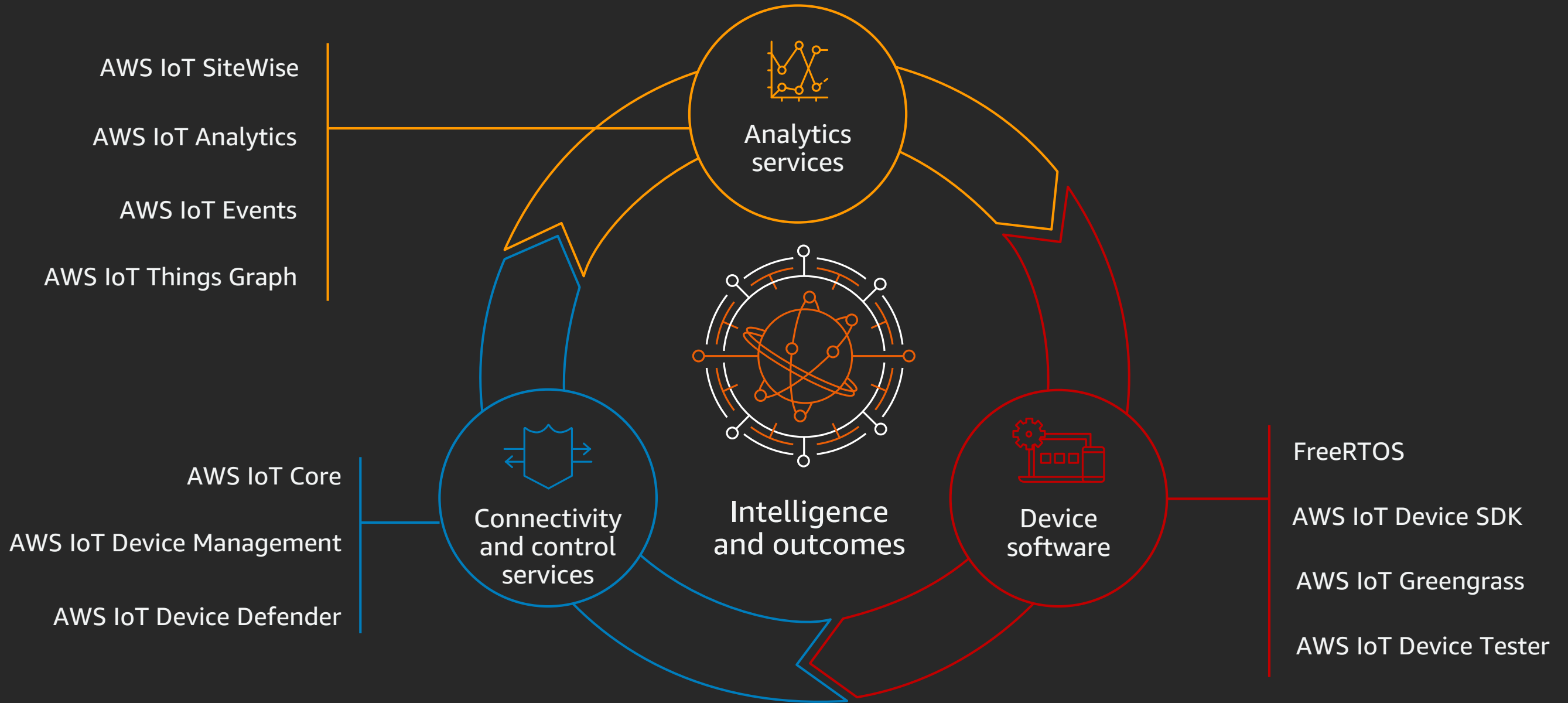


INNOVATING USING AWS CLOUD

AWS IoT Virtuous Cycle



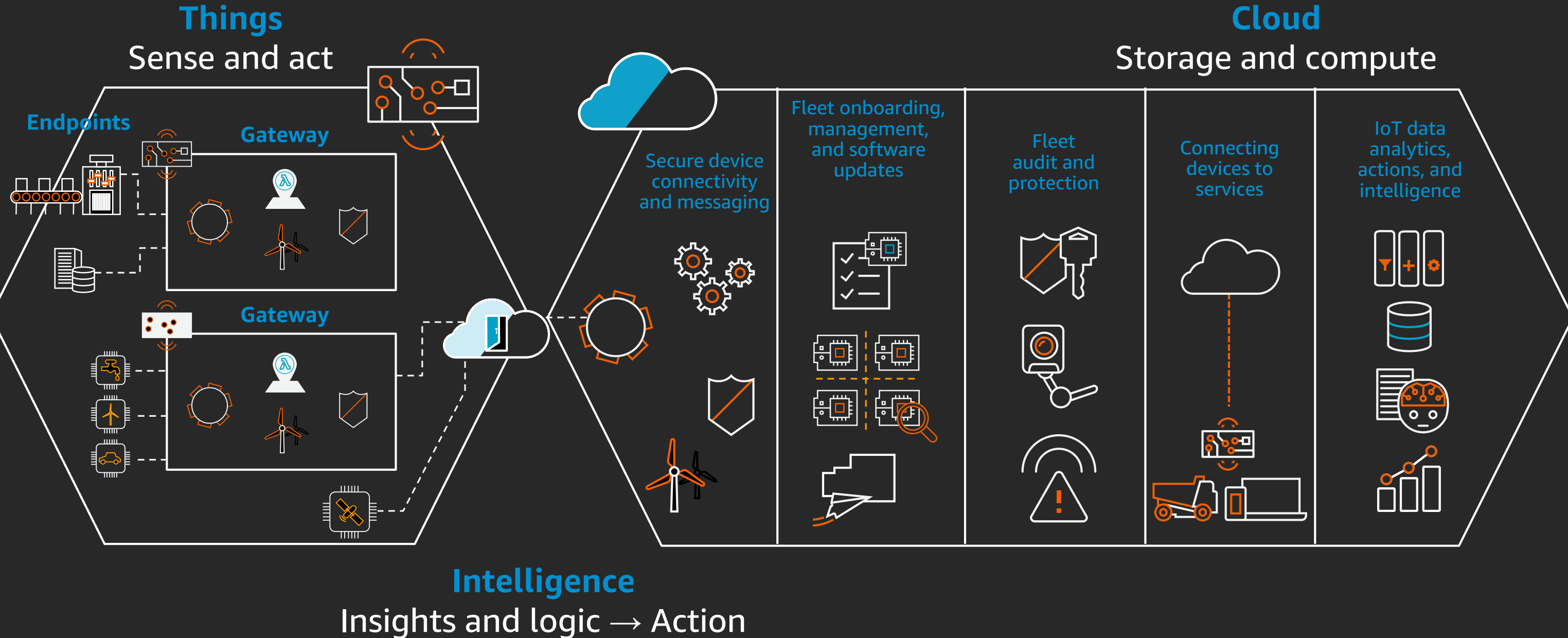
IoT virtuous cycle



Integrated Security with AWS
















AWS IoT architecture




The AWS Machine Learning Stack

Broadest and most complete set of Machine Learning capabilities








AI SERVICES

VISION  Amazon Rekognition	SPEECH   Amazon Polly Amazon Transcribe <i>+Medical</i>	TEXT    Amazon Comprehend Amazon Translate Amazon Textract <i>+Medical</i>	SEARCH  Amazon Kendra	CHATBOTS  Amazon Lex	PERSONALIZATION  Amazon Personalize	FORECASTING  Amazon Forecast	FRAUD  Amazon Fraud Detector	DEVELOPMENT  Amazon CodeGuru	CONTACT CENTERS  Contact Lens <i>For Amazon Connect</i>
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ML SERVICES

 Amazon SageMaker	Ground Truth	AWS Marketplace for ML	SageMaker Studio IDE							Neo	Augmented AI		
			Built-in algorithms	Notebooks	Experiments	Processing	Model training & tuning	Debugger	Autopilot	Model hosting	Model Monitor		

ML FRAMEWORKS & INFRASTRUCTURE

  	   	Deep Learning AMIs & Containers	GPUs & CPUs	Elastic Inference	Inferentia	FPGA
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Amazon SageMaker

Prepare

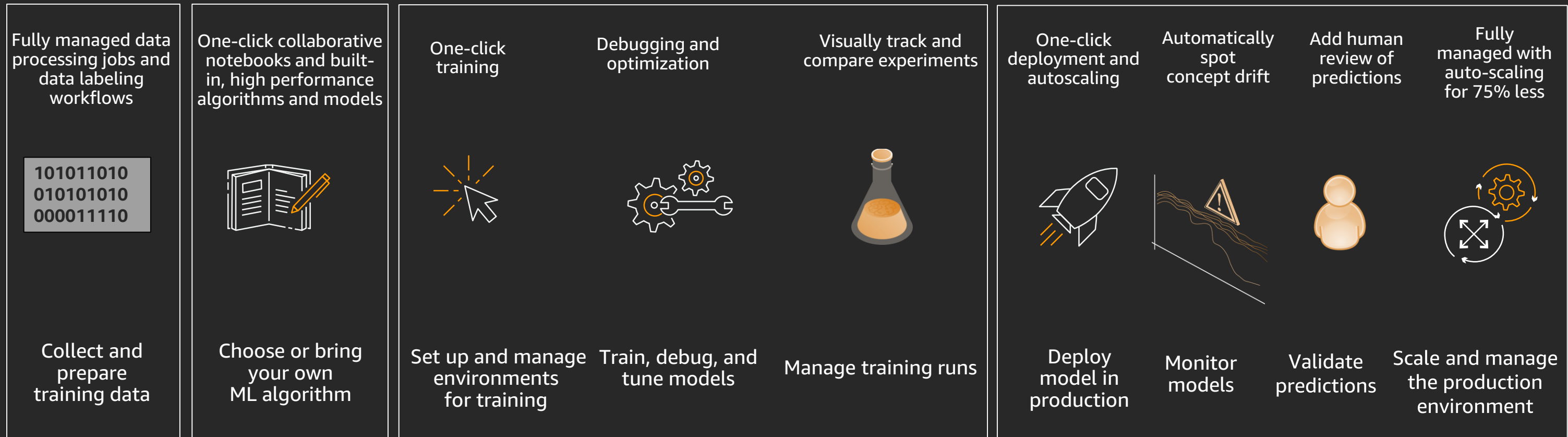
Build

Train & Tune

Deploy & Manage

Web-based IDE for machine learning

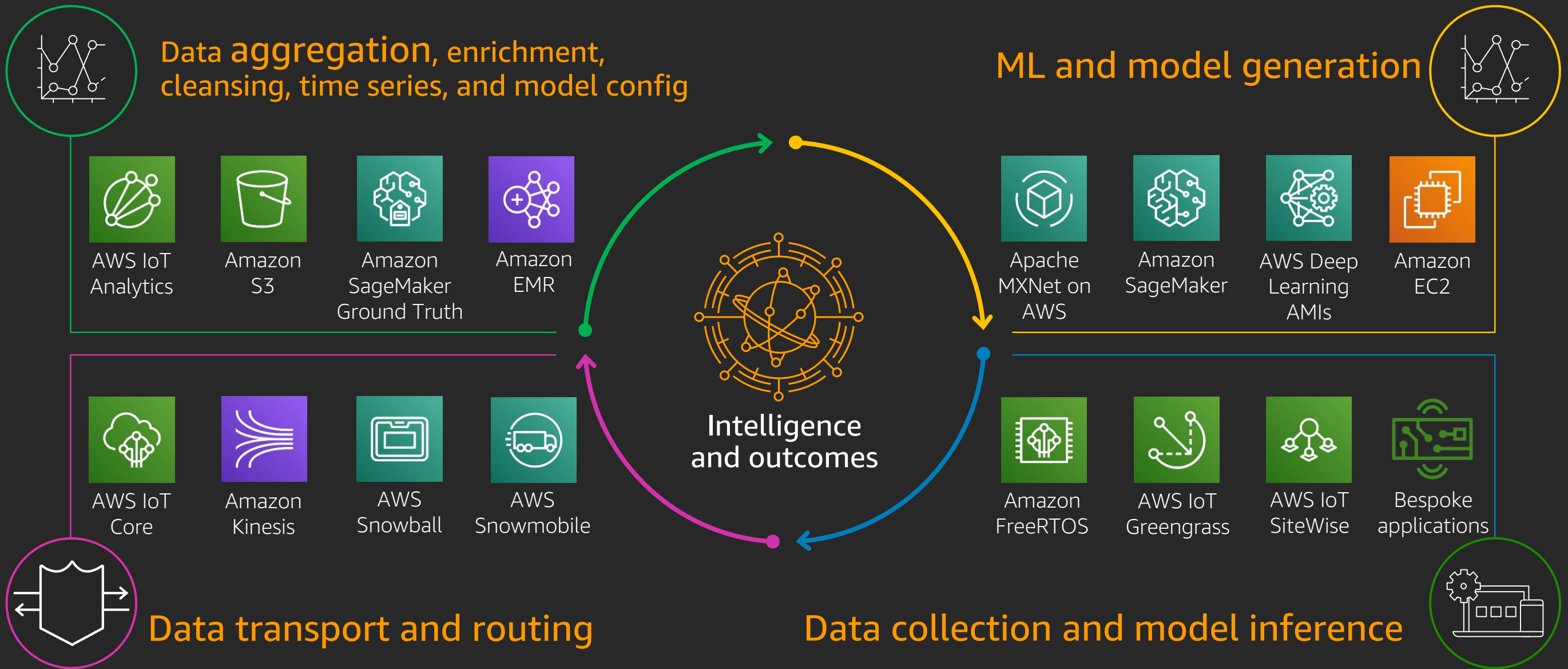
Automatically build and train models



A managed service that helps customers build, train, and deploy machine learning models

ML at the edge

Train in the cloud and infer at the edge



AWS Wavelength

AWS compute and storage services within the telecommunications providers' datacenters at the edge of 5G networks



Low latency/
high bandwidth



Consistent
development
experience

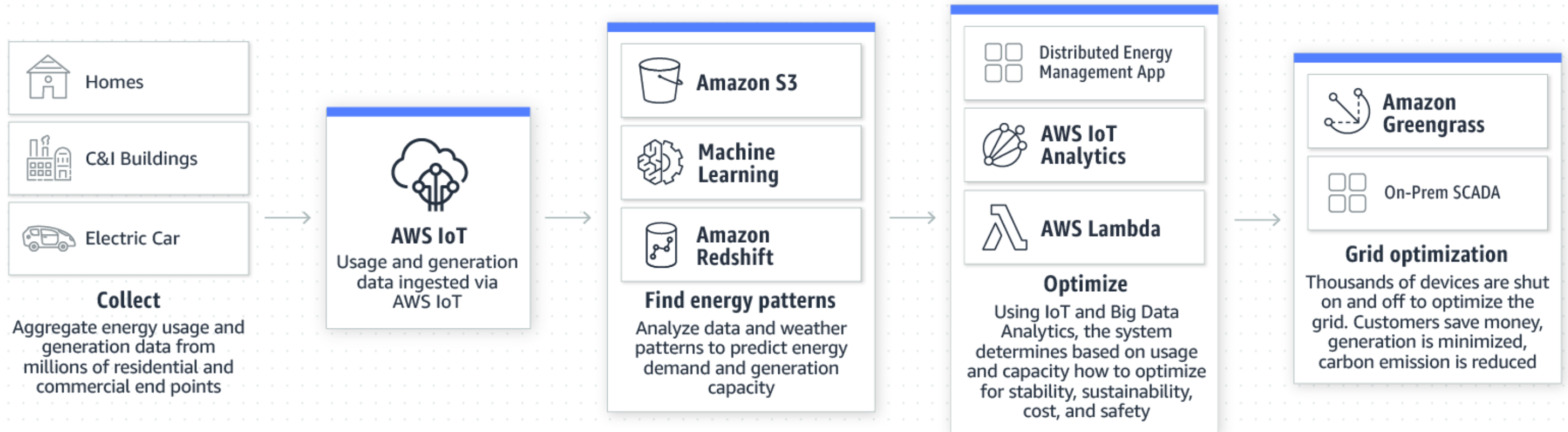


Same AWS benefits

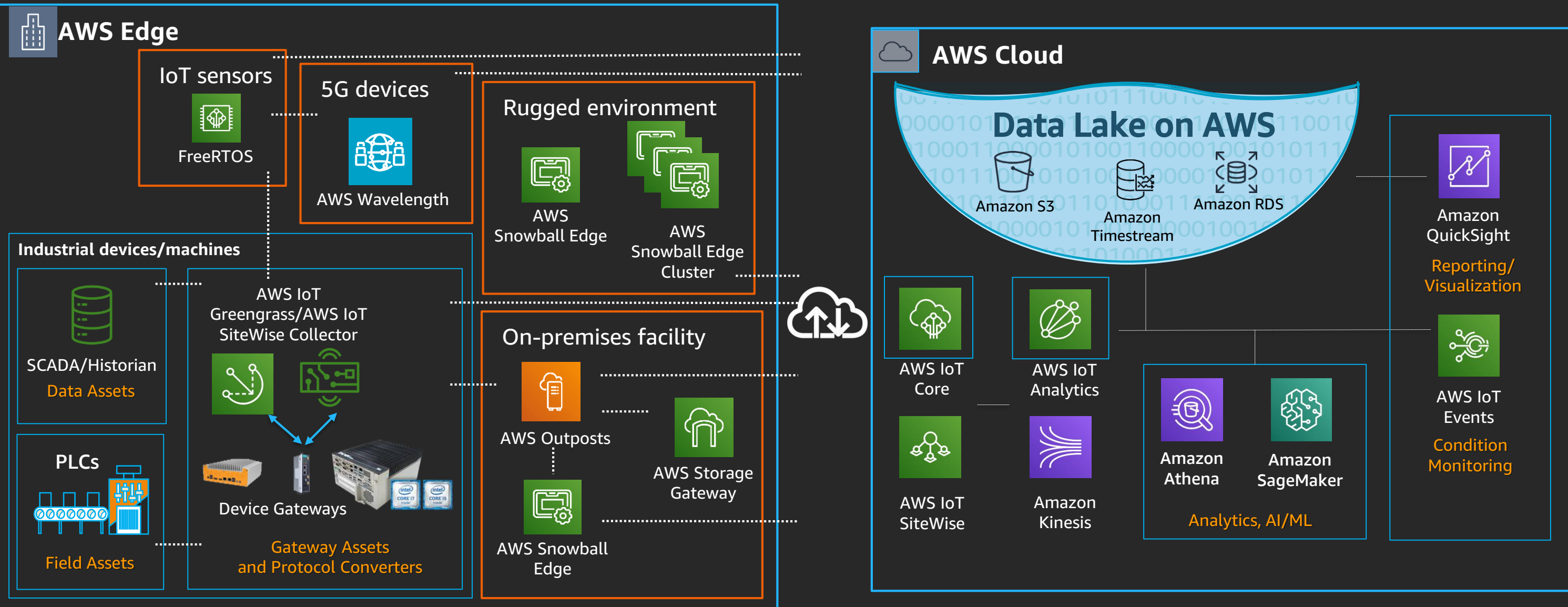


Ubiquity

Platform Design Patterns - Utilities

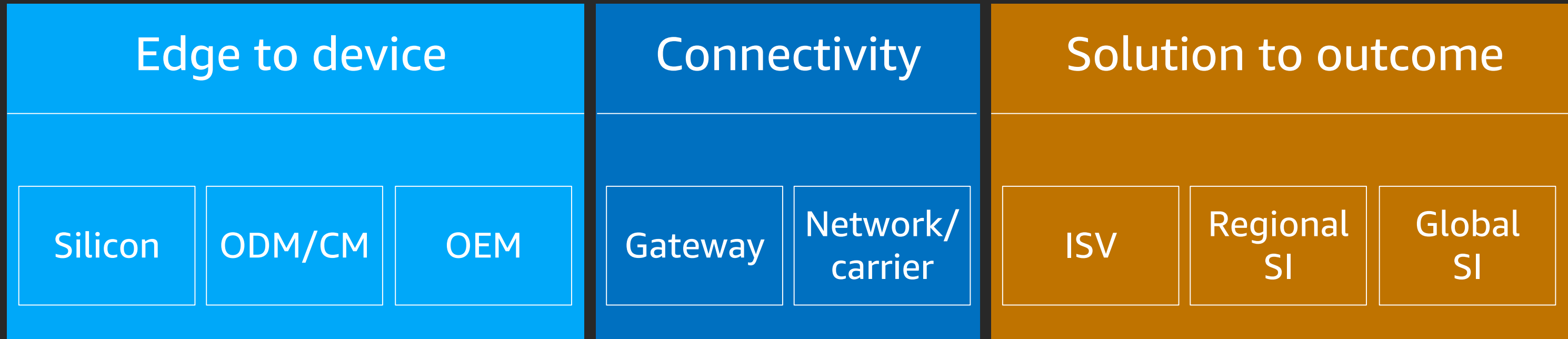


High Level Hybrid IoT Architecture



AWS IoT Partnership Approach

Edge to Outcome Partner Value Chain



Mission: *To provide the most comprehensive partner community powered by AWS IoT services that simplifies solution-build-to-adoption and accelerates digital transformation and time to value for our partners and their customers.*

Our Customers Achieve Business Outcomes Faster Using Solutions Built by AWS and our APN Partners



AWS IoT Solutions

Help you quickly solve problems across common industry use cases.



APN Solutions

Accelerate your time to value leveraging the expertise of APN Partners and their pre-built solutions.

AWS CLOUD MEANS
INNOVATION FOR LIFE

*When it comes to public sector innovation,
there's no limit to what's possible,
no matter where you are in the world.*

Thank you!

Aditi Gupta

<https://www.linkedin.com/in/aditisgupta>