
AWS
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NOV. 28 – DEC. 2, 2022 | LAS VEGAS, NV

AUT202

The next generation of vehicle technologies

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Agenda

1. **The big data loop**

   Automotive development: A focus on the “big loop”

2. **BMW: ML in the cloud**

   BMW Connected AI Platform

3. **Bosch: ML from cloud to edge**

   The power of collaboration: Bosch information domain computer

4. **Summary**

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Automotive development: A focus on the “big loop”

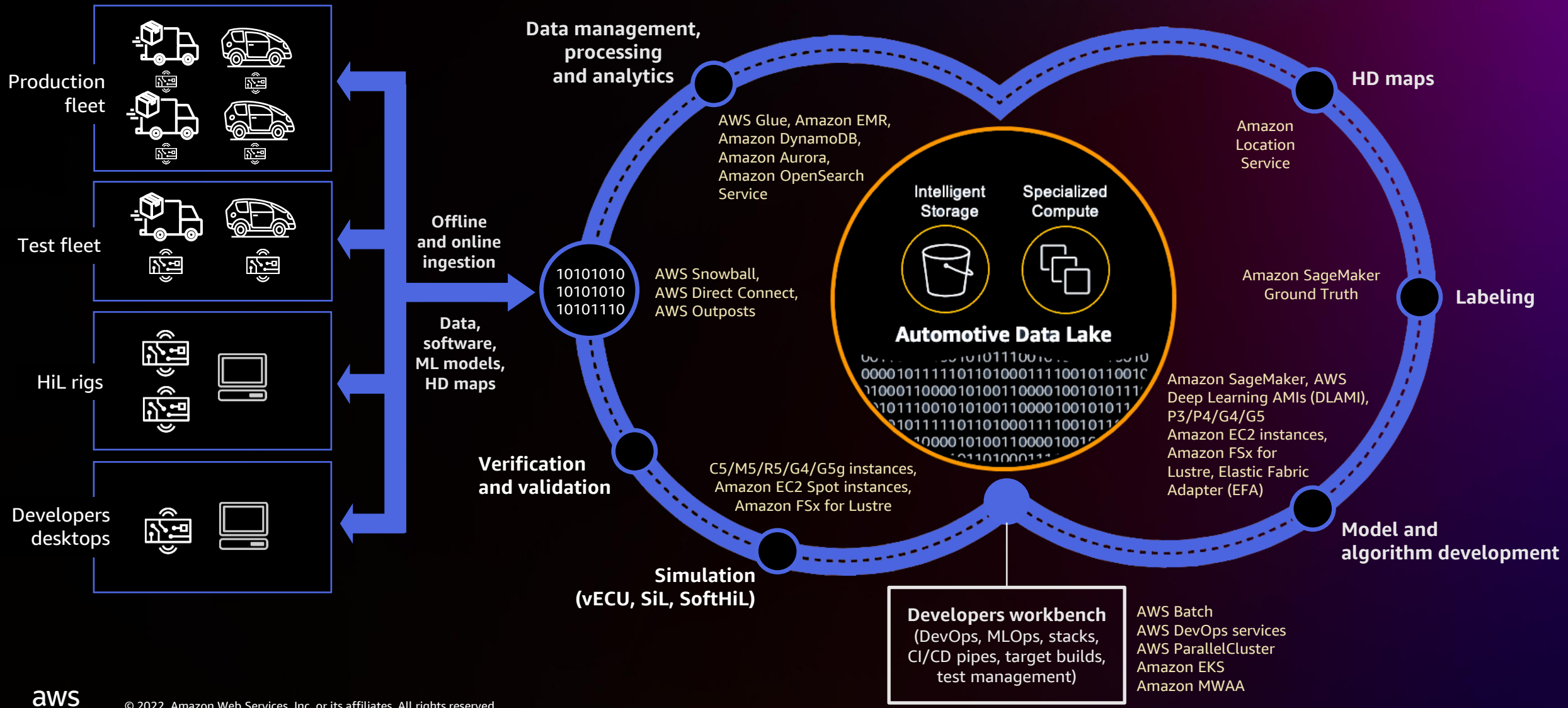
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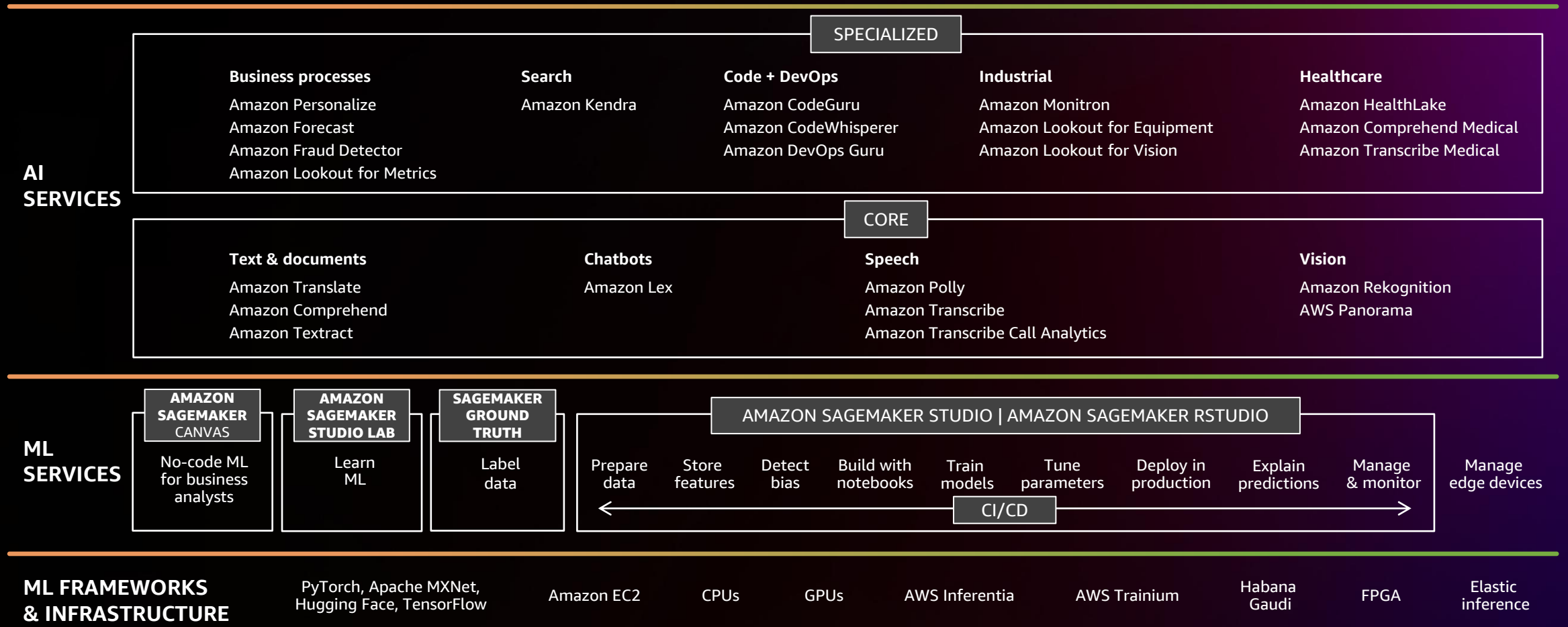
Automotive development “infinity” workflow



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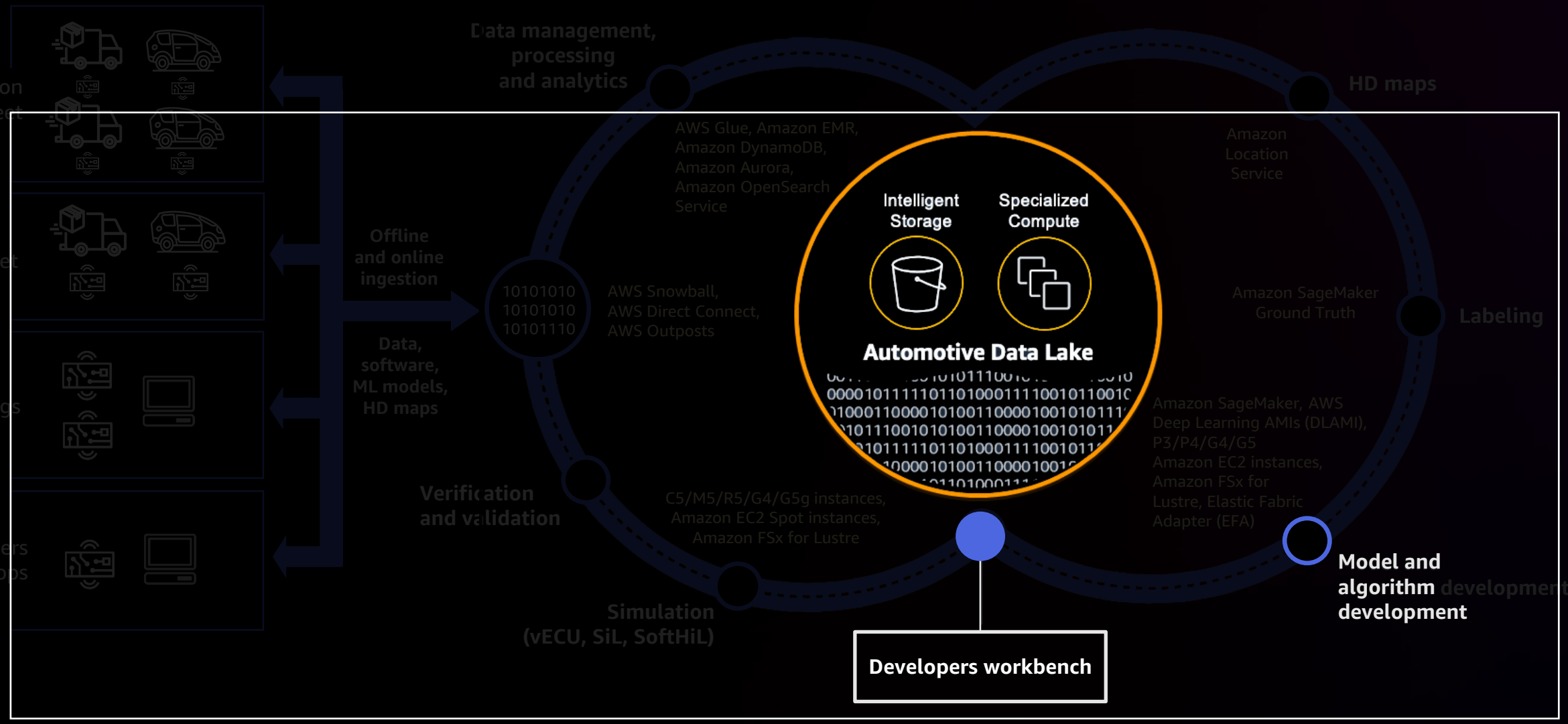
The AWS ML stack

BROADEST AND MOST COMPLETE SET OF MACHINE LEARNING CAPABILITIES



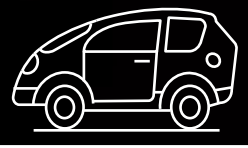
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BMW: ML in the cloud



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Enter the “big loop”



Autonomy ECU



SW

Data

10101010
10101010
10101110

Data management, processing, and analytics

HD maps

Intelligent Storage

Specialized Compute

Automotive Data Lake

Labeling

Model & algorithm development

Verification and validation

Simulation (vECU, SiL, HiL)

Developers workbench

Sensors

- Radars
- Cameras
- LiDAR
- …

Actuators

- Steer-By-Wire
- Brake-By-Wire
- …

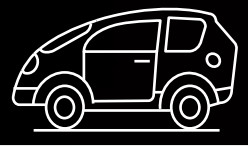


Driver

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It’s a Cloud-to-Edge Continuum





Autonomy ECU

Autonomy software [Test in shadow]

Autonomy software [Prod]

OTA agent

Edge intelligence agent

SW

Data

10101010
10101010
10101110

Sensors

Radars

Cameras

LiDAR

…

Actuators

Steer-By-Wire

Brake-By-Wire

…



Driver

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Data management, processing, and analytics

HD maps

Intelligent Storage

Specialized Compute

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Verification and validation

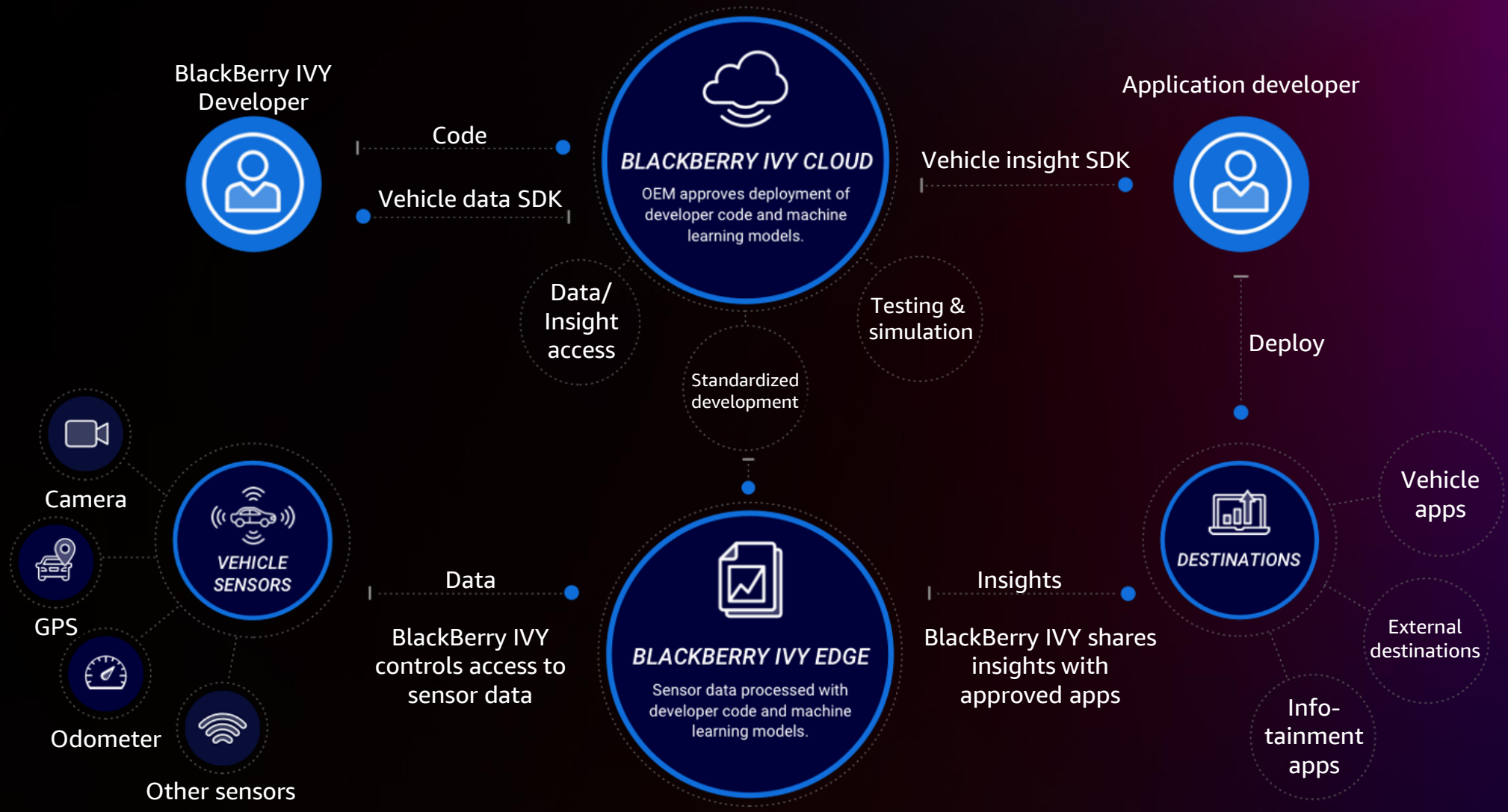
Model & algorithm development

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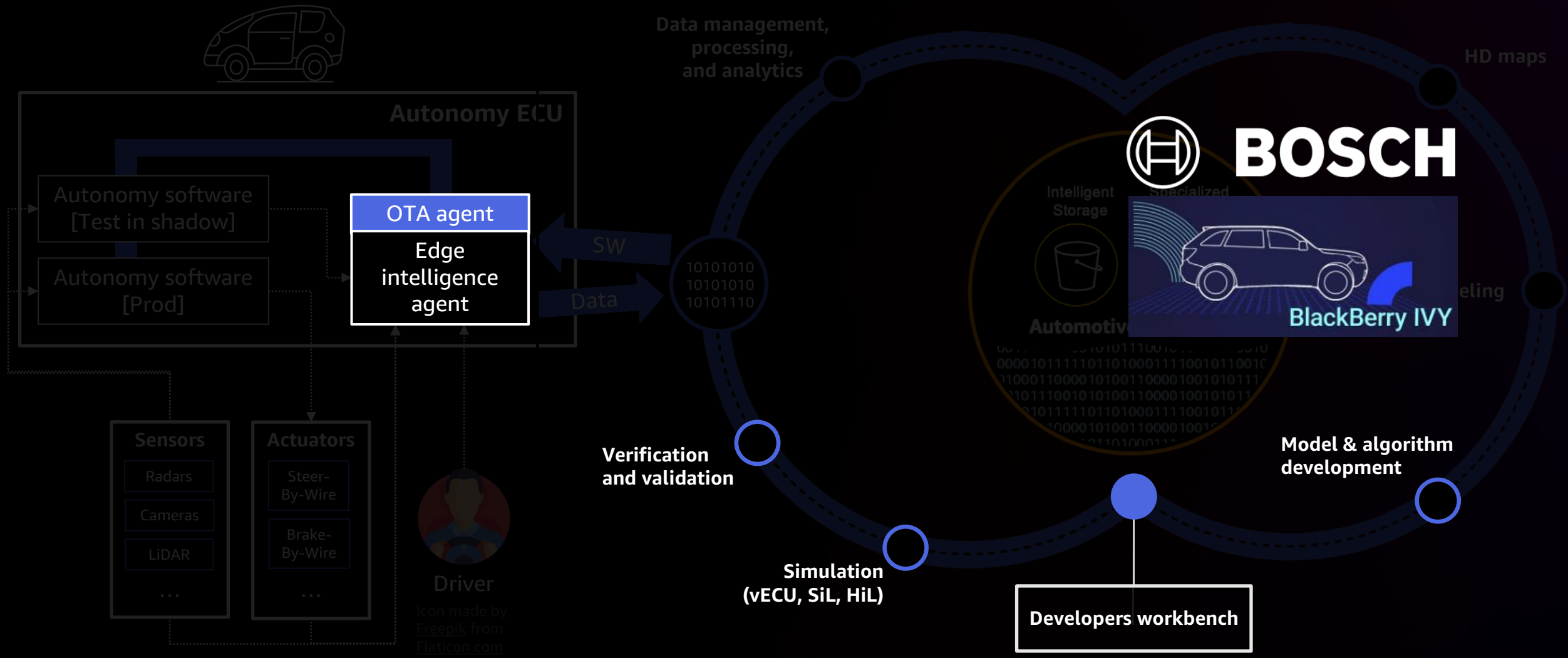
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BlackBerry IVY: A middleware for the big loop



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Bosch: ML from cloud to edge



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BMW Connected AI Platform

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BMW Connected AI Platform

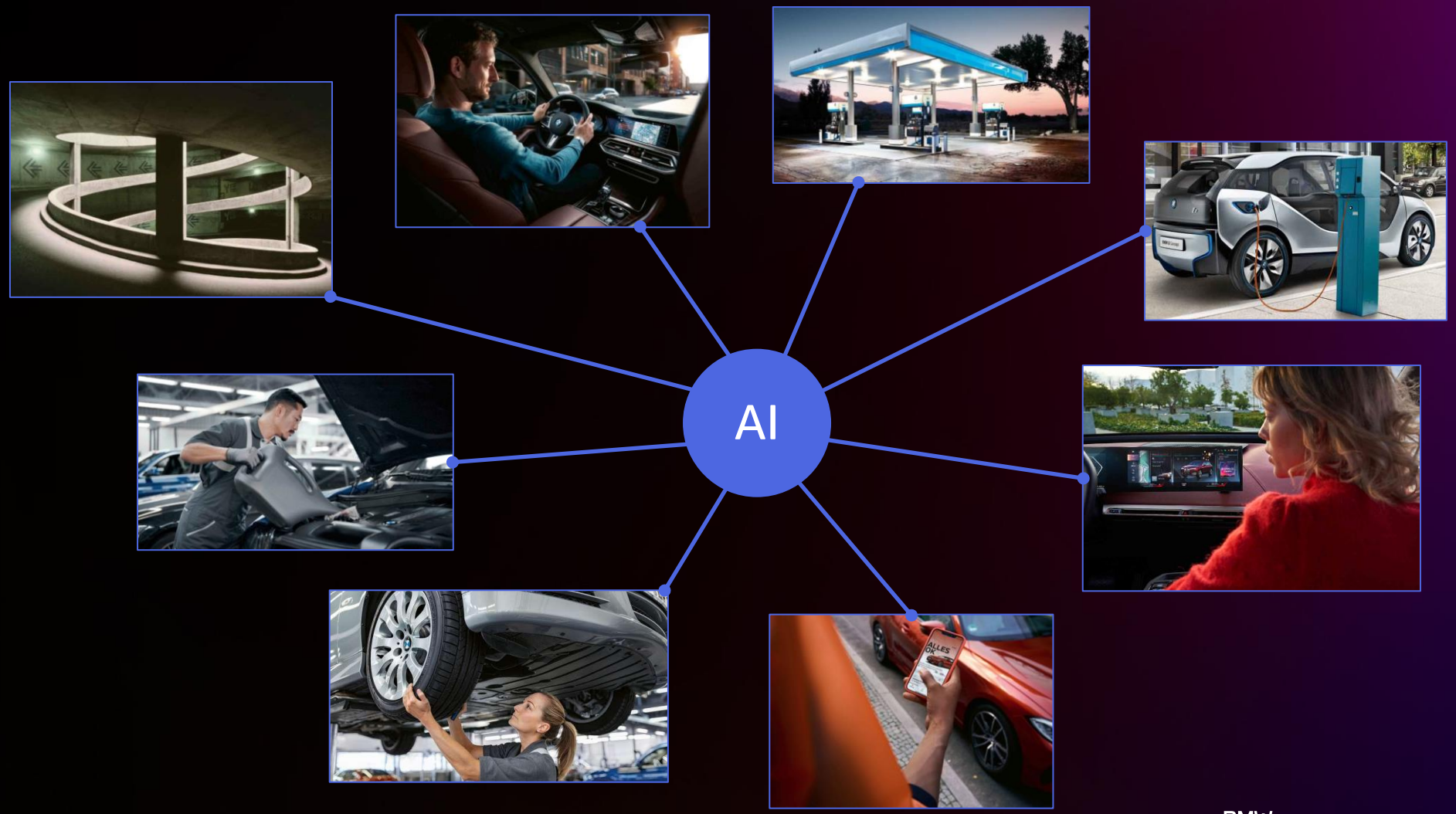
- Motivation
- Architecture
- User interface for data scientists
- Conclusion and outlook

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Motivation

SCALING AI FOR THE BEST CONNECTED VEHICLE EXPERIENCES



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You cannot be an expert in everything ...

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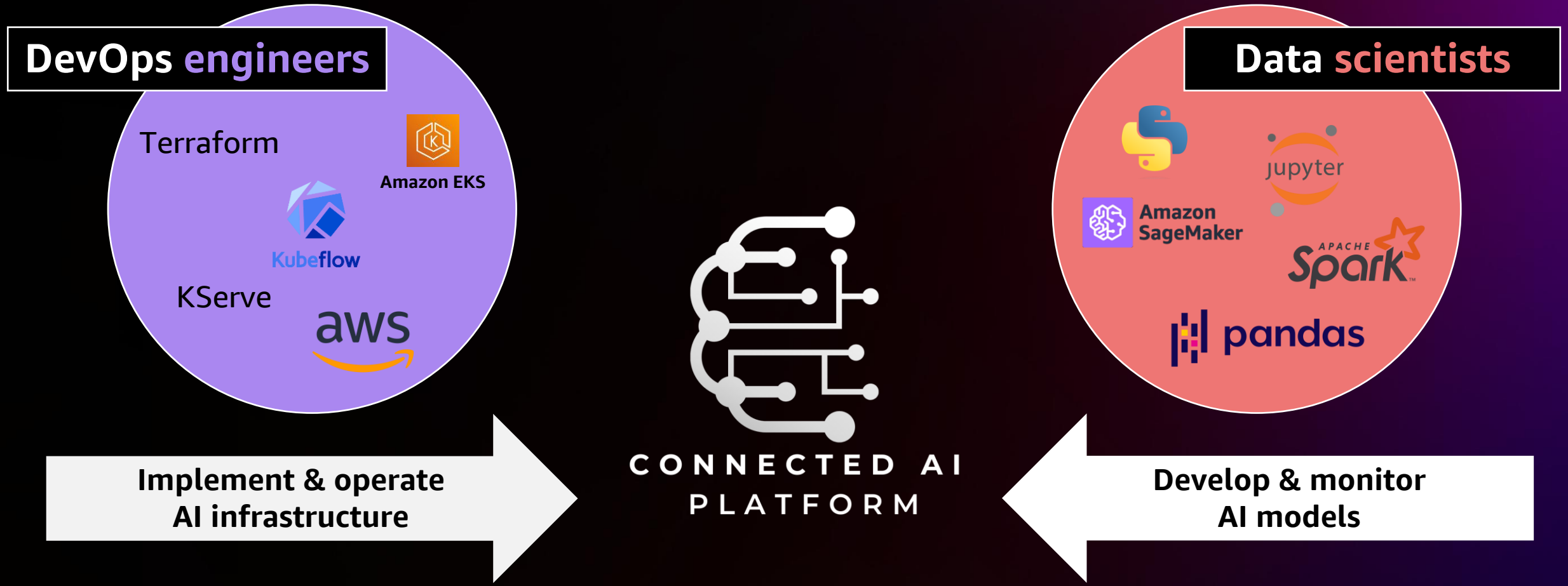
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And you do not have to be

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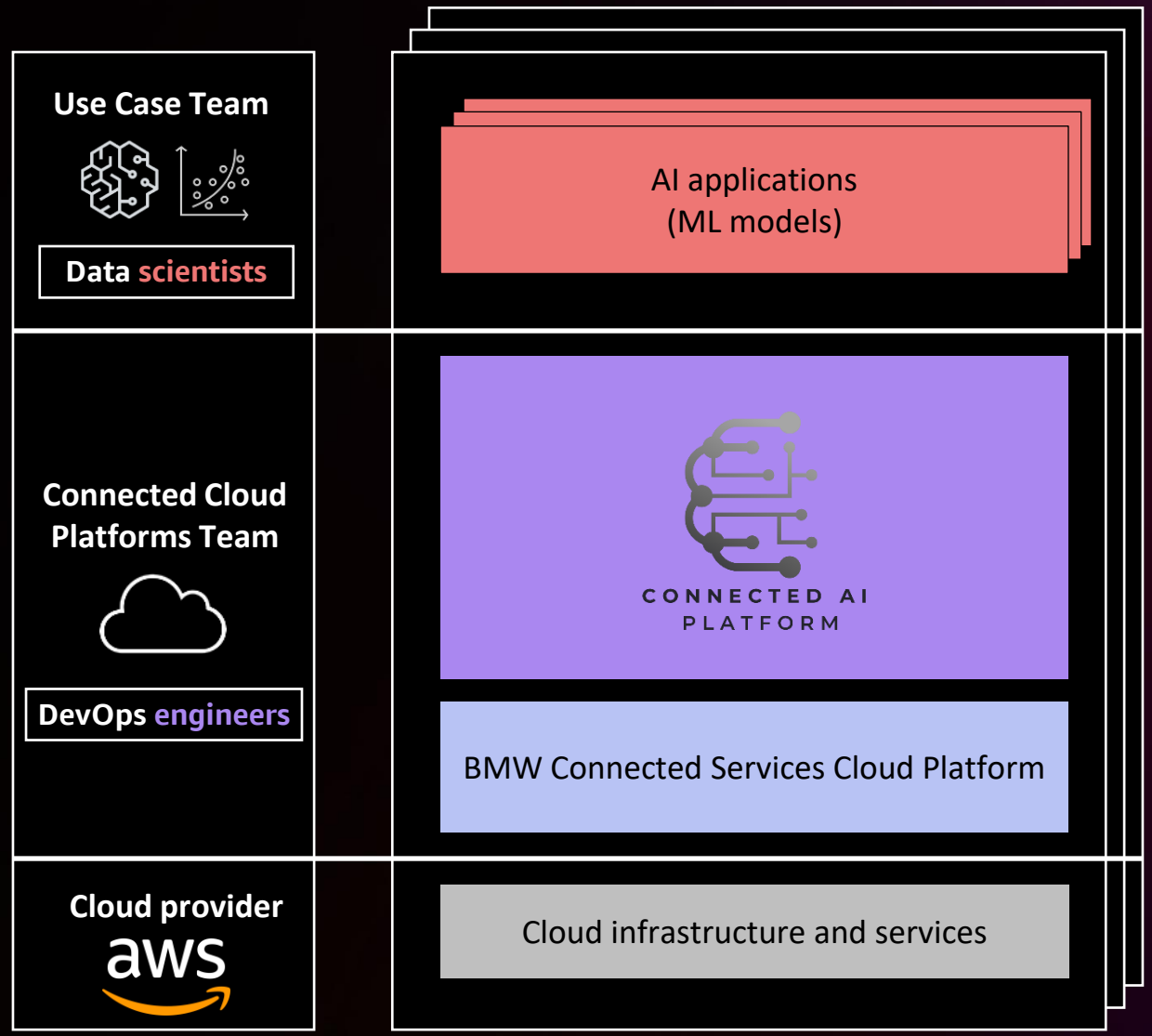
Connecting DevOps engineers & data scientists



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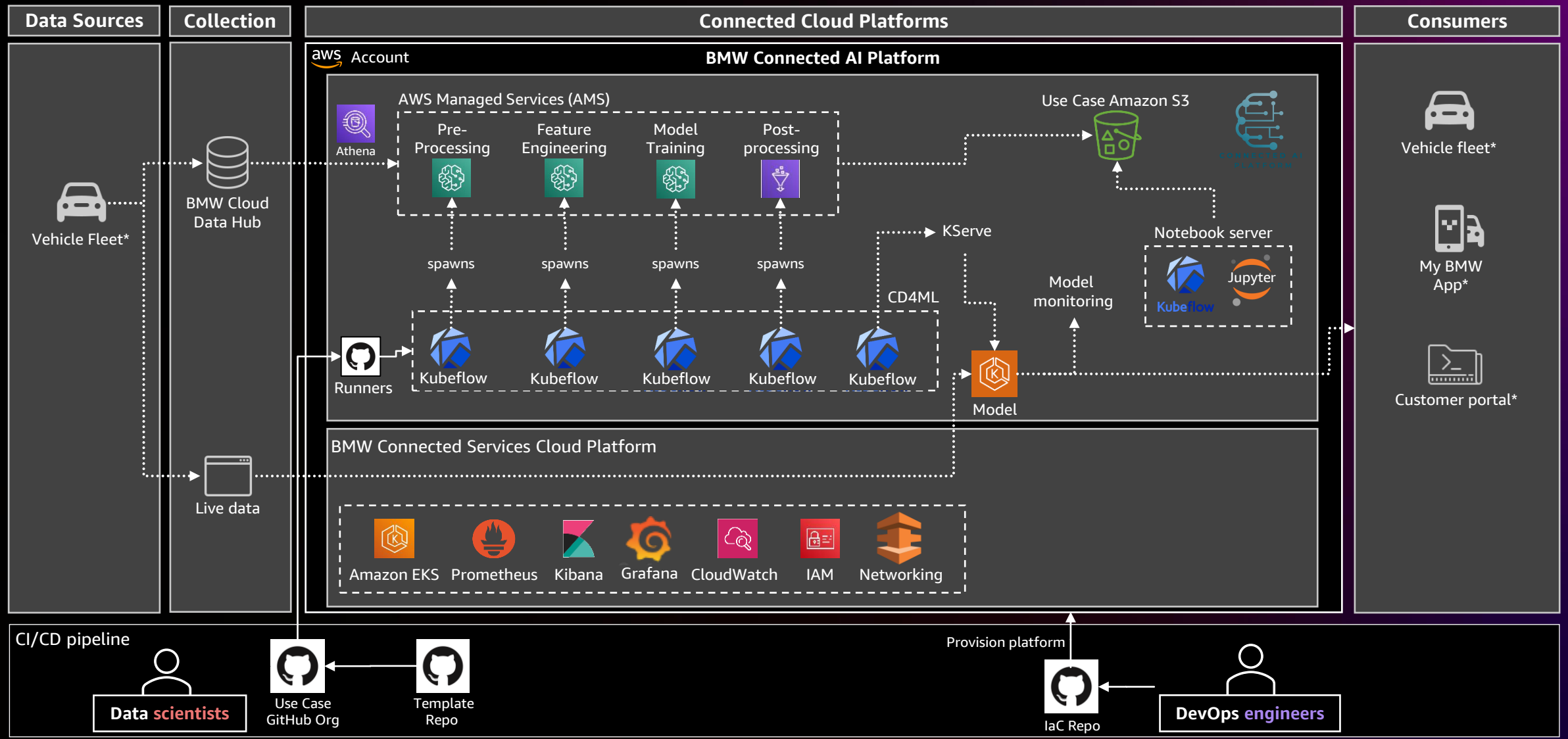
3-layer concept to scale connected vehicle AI



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BMW Connected AI Platform architecture

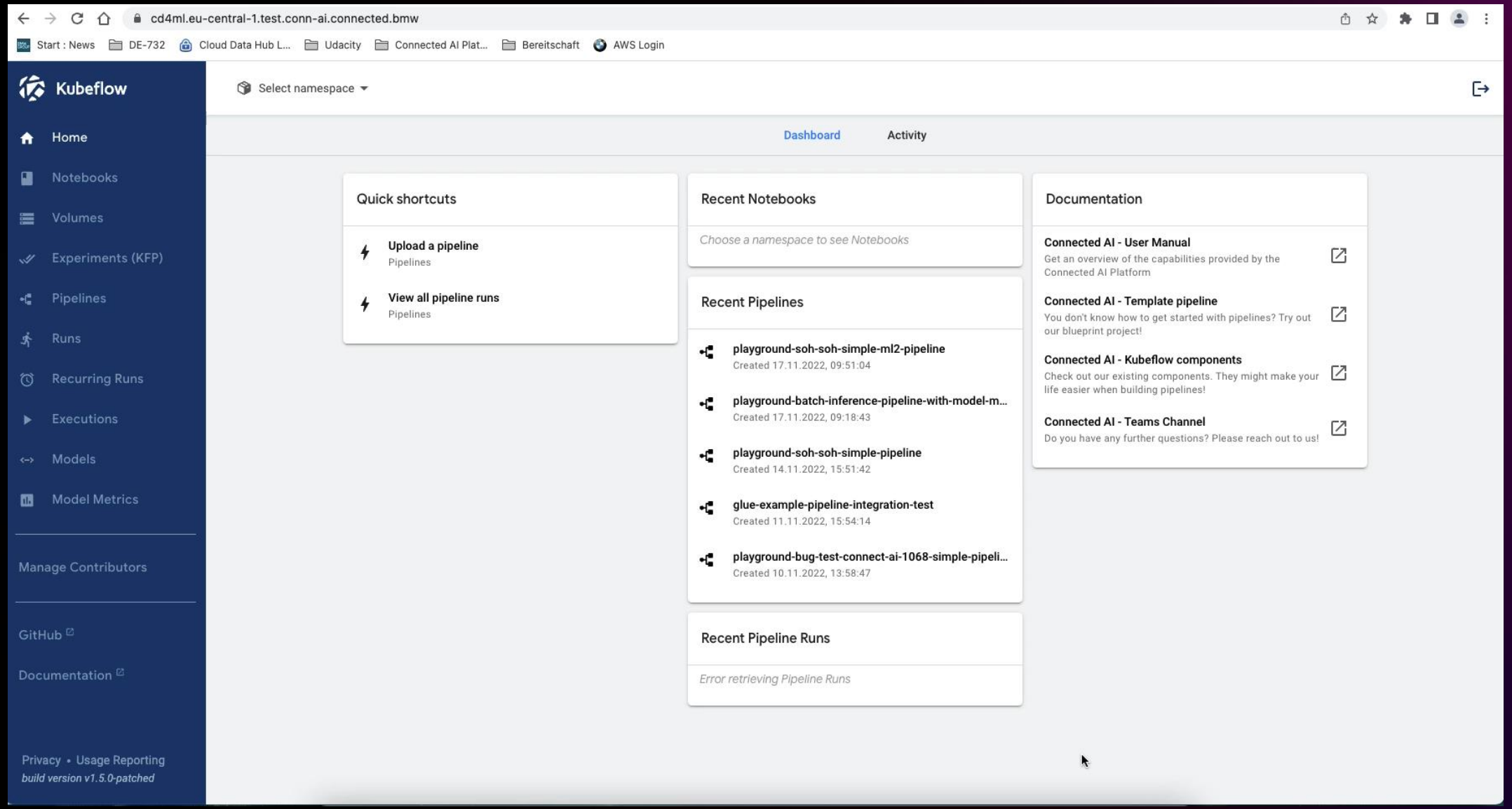


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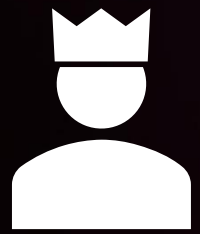
User interface for data scientists



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Example: Smart vehicle maintenance



Customer

Proactive care

Offer the right service at the right time


My BMW App


Email


Phone


In-vehicle


Workshop tools


Service consultant


Technician

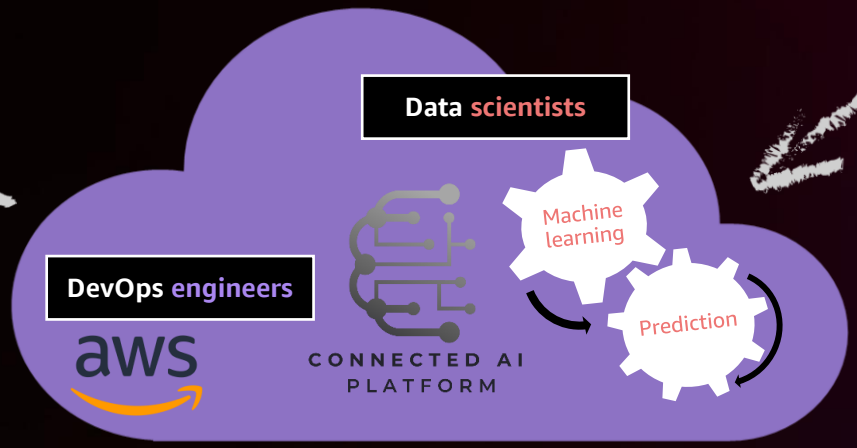


Customer consent



Identify vehicle maintenance needs

by data analytics/machine learning

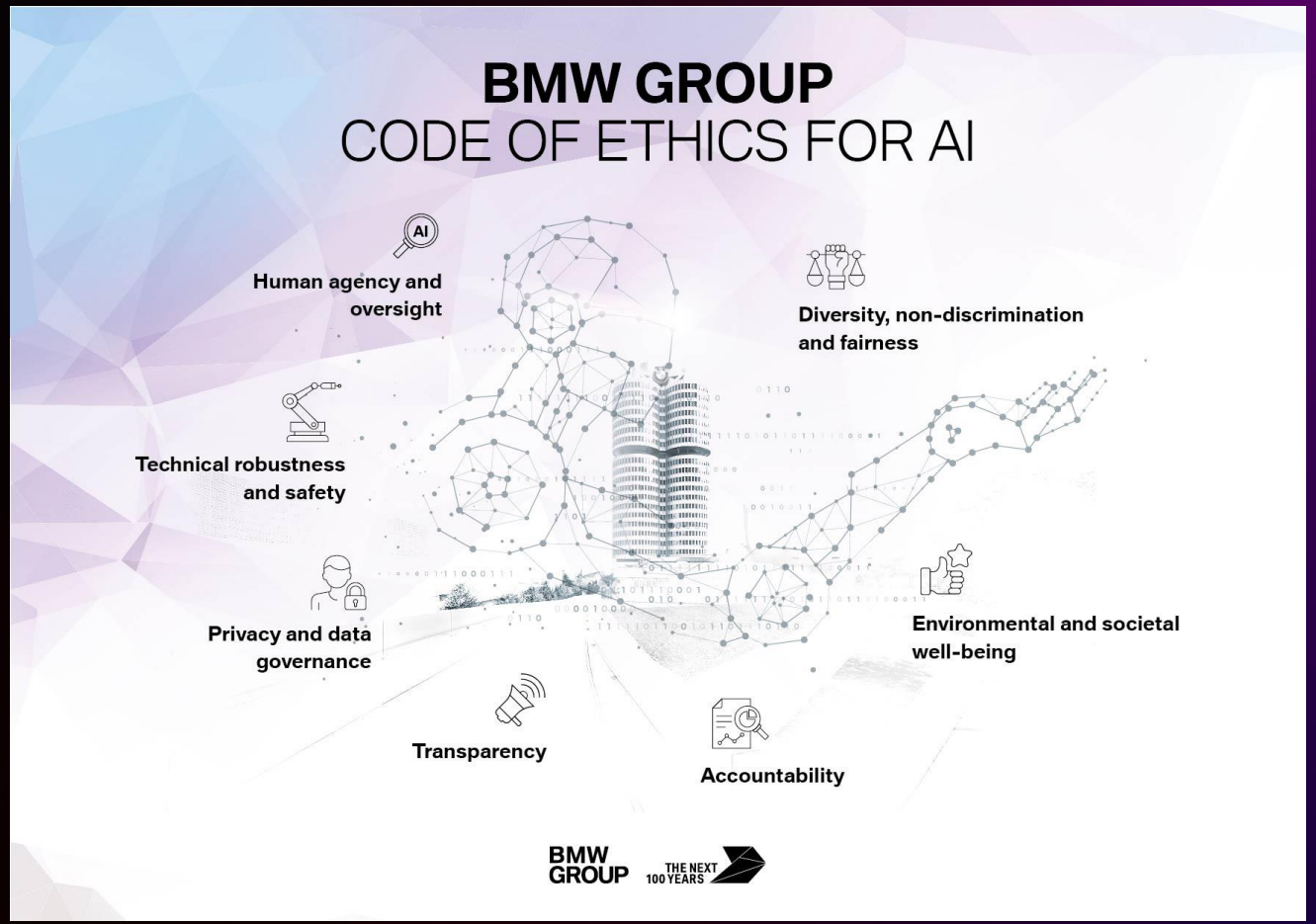


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Data and AI come with responsibility

- Customer choice and consent
- Privacy by design
- BMW Code of Ethics for AI



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Conclusion and outlook

Today

- BMW Connected AI Platform is live to scale connected vehicle AI
- DevOps engineers and data scientists can focus on their expertise
- AI and non-AI use cases run on the same infrastructure
- AWS and open source integrate well
- Responsibility

Coming up

- Global rollout of BMW Connected AI Platform
- Continue improving customer experiences using AI



CONNECTED AI PLATFORM

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The power of collaboration: Bosch information domain computer

Stefan Buerkle

Sr. Vice President Connected Information Systems & Sales – Bosch in North America



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One global network – from the region for the region

402,600
Associates worldwide

76,100
R&D associates

38,000
Software engineers

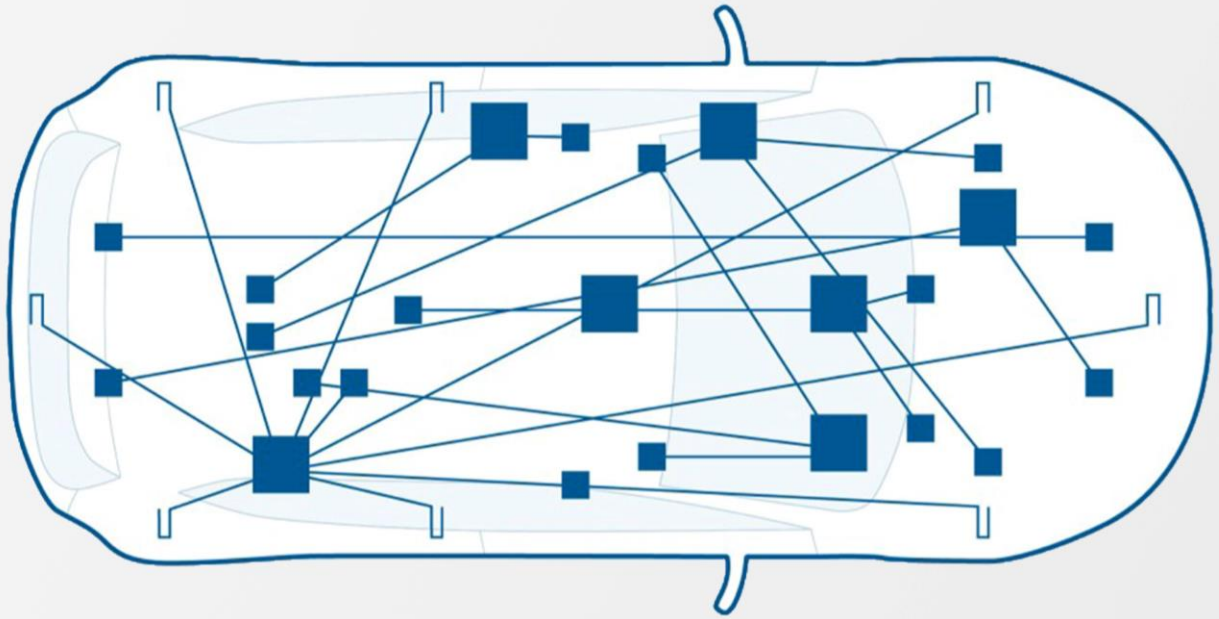
In more than

60
countries



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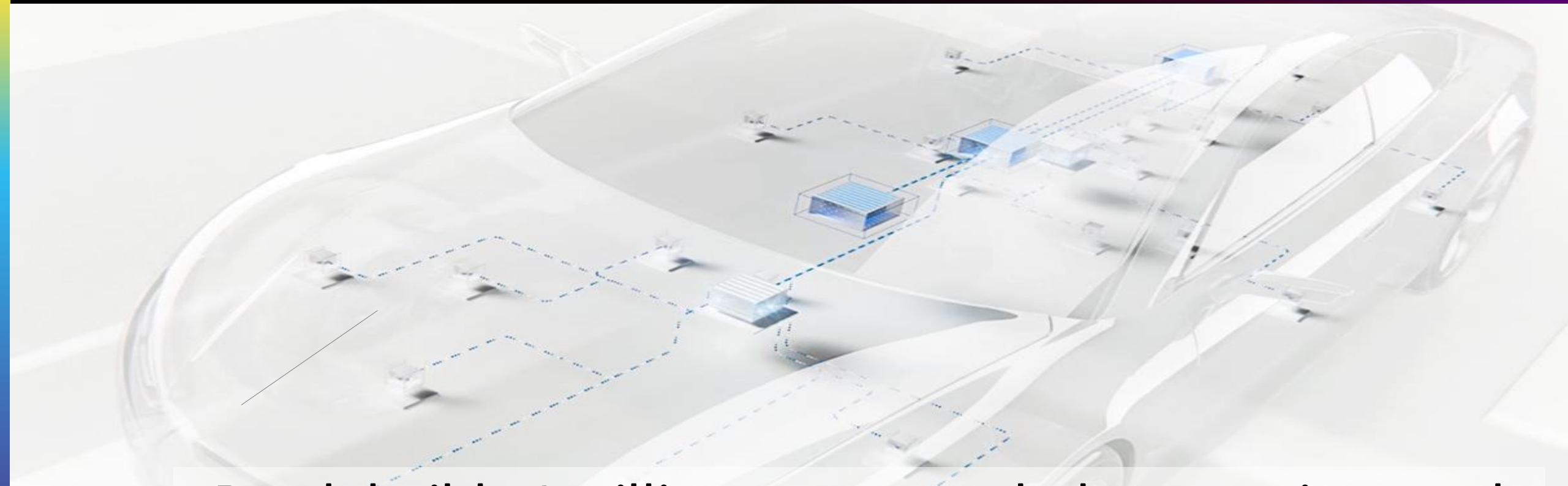
Performance to power the future



From embedded systems...

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Bosch is accelerating the development of the software defined vehicle



Bosch builds 4 million sensors each day, covering nearly 70% of the vehicle sensor portfolio and drives exciting features with software development

How to connect the vehicle to the developer’s workbench



The Challenges

- Abstraction of vehicle specifics and complexity
- Clear separation of Work Areas
- Removing Dependencies
- Providing Common APIs
- Following Standards

The Goals

- Expand Services and Customer Experiences
- Accelerate Time to Market
- Simplify Development & Integration Complexity

Collaboration with leading technology providers required to enable innovative solution

BlackBerry IVY - Introduction

Blackberry IVY provides access to an ecosystem to support development of a transformational automotive innovation



Vehicle Model #1



Vehicle Model #2



Vehicle Model #n

IVY

(Pre-Integrated Middleware)

removing the need for multiple integrations

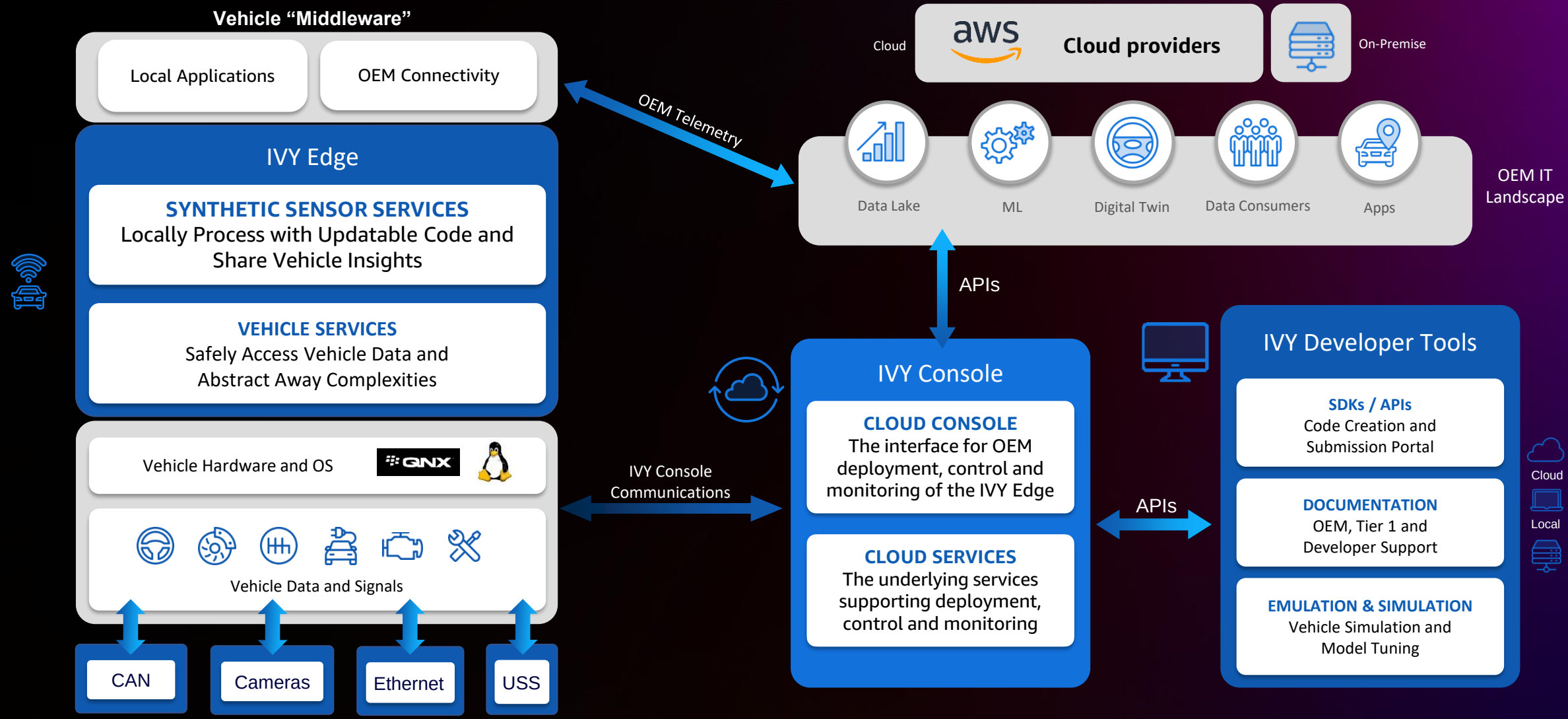
- Usage Based Insurance — GEICO, here, CerebrumX
- EV / Battery Management — ELECTRA
- Location Based Services — TOMTOM, here
- Smart Parking — BOSCH, Parkopedia, CarIQ
- Data Monetization — CerebrumX

- Analytics / Diagnostics — BOSCH, COMPREDICT
- In-Vehicle Payments — CarIQ
- Voice Services — alexa, cerence
- Fleet — ELECTRA, RIDECELL
- Consumer Products — amazon

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BlackBerry IVY and Bosch Platform – Overall architecture



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Blackberry IVY and Bosch demonstration

@AWS – Add loc
(i.e., room num
building) to slide
inform Stefan Bu
for speaking no



Demonstration vehicle at 2022 Bosch Connected World



Infotainment powered by Bosch information domain computer with IVY platform

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Lessons learned

Managing an international team working on the same product/setup/codes-base

Clear architecture approach allows for –

- Clear work-split and delivery process
- Good identification of APIs to define and provide functions and data
- Easy integration of third party as artificial sensor provider within IVY without dependency to the real system /access to it
- HMI application development based on third-party sensors still a challenge due to the nature of HMI development, but no interaction or dependencies to the sensor team



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Summary

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Summary

- Automotive Development is now a **big loop**: AI needs to be designed natively in software workflows, from cloud to vehicle edge and back
- AWS support the big loop with Amazon SageMaker, its CI/CD services, and with the strategic collaboration on Blackberry IVY
- In this session, we presented two customer cases that cover the big loop:
  - **BMW** Connected AI Platform scales connected vehicle AI to improve customer experiences
  - **Bosch** uses Blackberry IVY to offer a platform to deliver virtual vehicle sensors
- Please meet us at re:Invent
  - Come to the **Industry Demo Tent**, where you can see demos about BlackBerry IVY and more
  - Watch out for the publication of **AUT303 workshop**, where you can experience BlackBerry IVY hands-on

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Thank you!



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