



EMEA HEALTHCARE & LIFE SCIENCES - VIRTUAL

# AWS for Pharma Manufacturing

## Part of 2023 AWS Workshops

Join our series of free one-day technical workshops led by AWS industry experts



**Wednesday 5th July, 13:00 - 17:00 GMT+2**

**REGISTER TODAY**



EMEA HEALTHCARE & LIFE SCIENCES WORKSHOPS

# AWS for Pharma Manufacturing

**Enno Schulte**

Solutions Architect  
Amazon Web Services

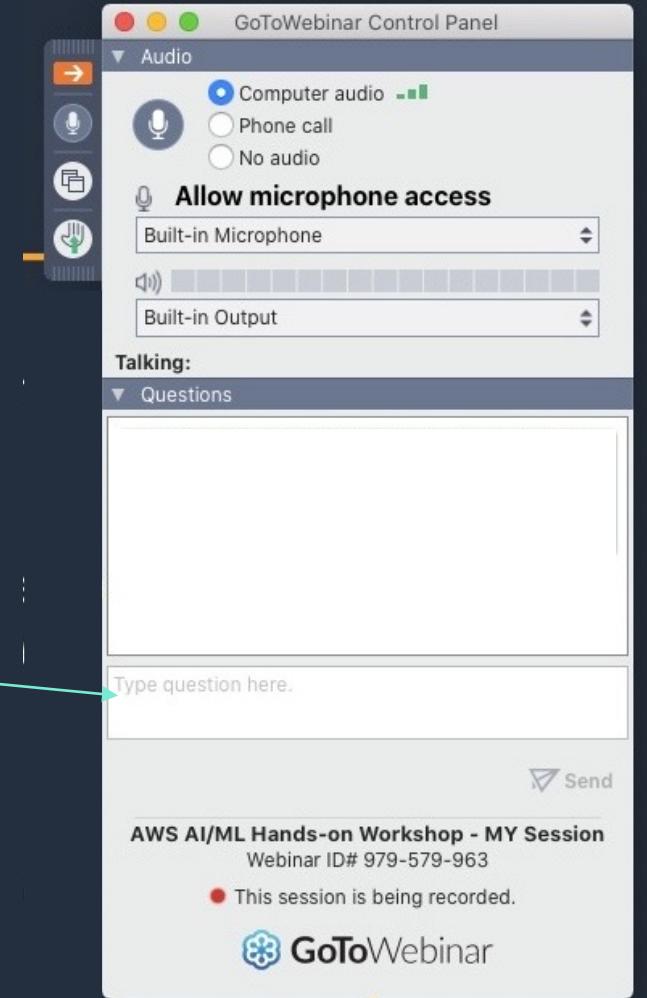
# Questions & Answers

If you have any questions or encounter issues during the workshop, our support team is online.

You can submit your query in the GoToWebinar Questions function. To submit questions, select "Send"



Type your question here



# Agenda

- 13:00 – 14:00 Pharma Manufacturing @ AWS
- 14:00 – 14:30 IoT Demo
- 14:30 – 14:45 Break
- 14:45 – 16:30 Hands-On Workshop Data Lake in Action
- 16:30 – 17:00 Wrap-Up and Survey

# Workshop materials and instructions

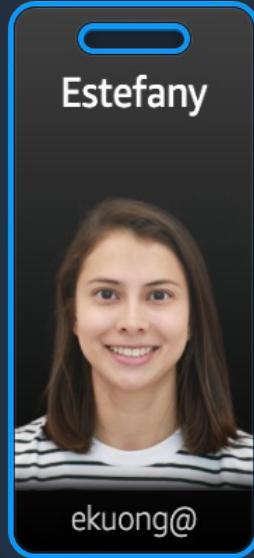
- <https://catalog.us-east-1.prod.workshops.aws/workshops/46ef2cd7-6e24-4195-8711-8e89dd9e8af2/en-US>

# Your presenters today



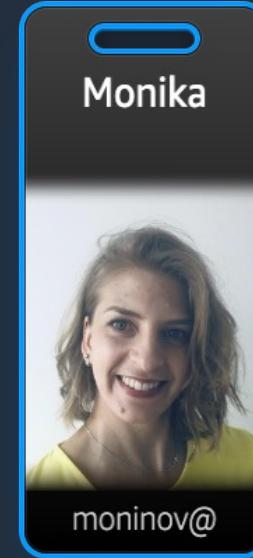
**Enno Schulte**

[ennop@amazon.de](mailto:ennop@amazon.de)



**Estefany Kuong Montalvan**

[ekuong@amazon.es](mailto:ekuong@amazon.es)



**Monika Nowakowska**

[moninov@amazon.pl](mailto:moninov@amazon.pl)

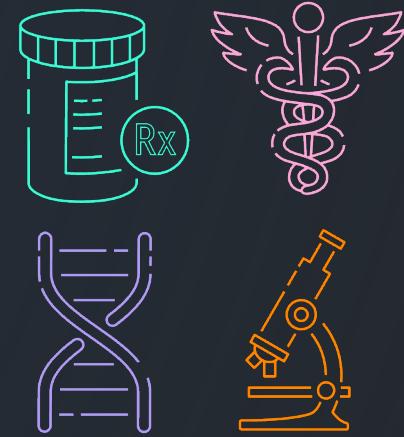
# AGENDA



DATA DRIVEN



INNOVATION



HEALTHCARE &  
LIFE SCIENCES

# 50 petabytes of healthcare & life sciences data generated annually by hospitals

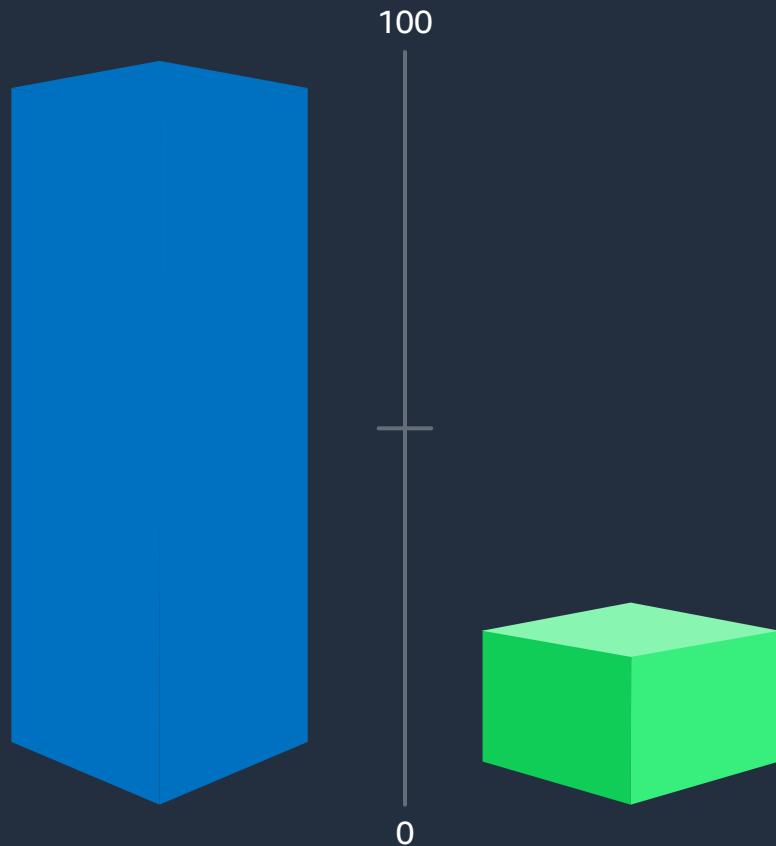


1: <https://www.weforum.org/agenda/2019/12/four-ways-data-is-improving-healthcare>

# Data is a strategic asset for HCLS organizations

COMPANIES OF ALL SIZES REALIZE THE IMPORTANCE OF DATA IN TODAY'S TECHNOLOGICAL LANDSCAPE

**99%**  
of businesses want  
to be data driven



**26.5%**  
of businesses have  
been successful

Harvard Business Review, [Why Is It So Hard to Become a Data-Driven Company](#)

# Create better business outcomes with data



Longitudinal and 360 views of patient, product, and customer journey



Faster time to insights and evidence generation



Move to predictive analytics to better understand patterns and outcomes



Increase productivity and efficiency through seamless collaboration and data



Single source of truth for all data workflows and analyses

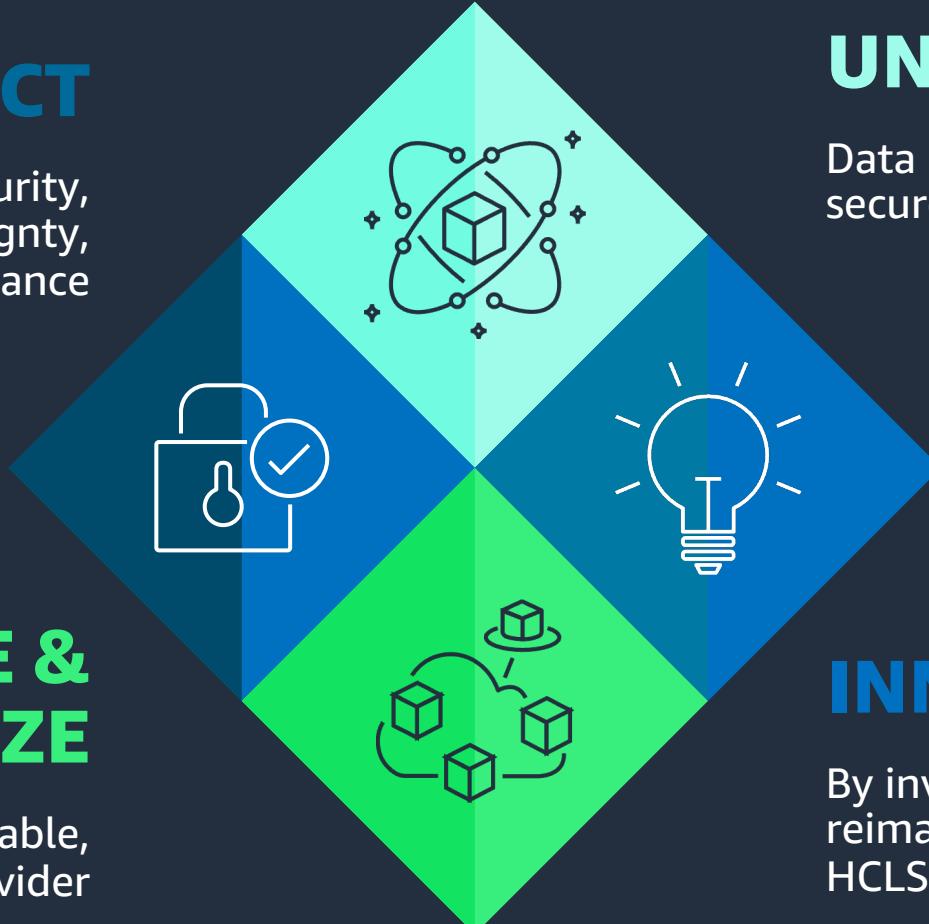
# Realize impact & outcomes with an end-to-end data strategy

## PROTECT

Ensure data security, privacy, data sovereignty, and regulatory compliance

## MIGRATE & MODERNIZE

Data infrastructure with a scalable, trusted, and secure cloud provider



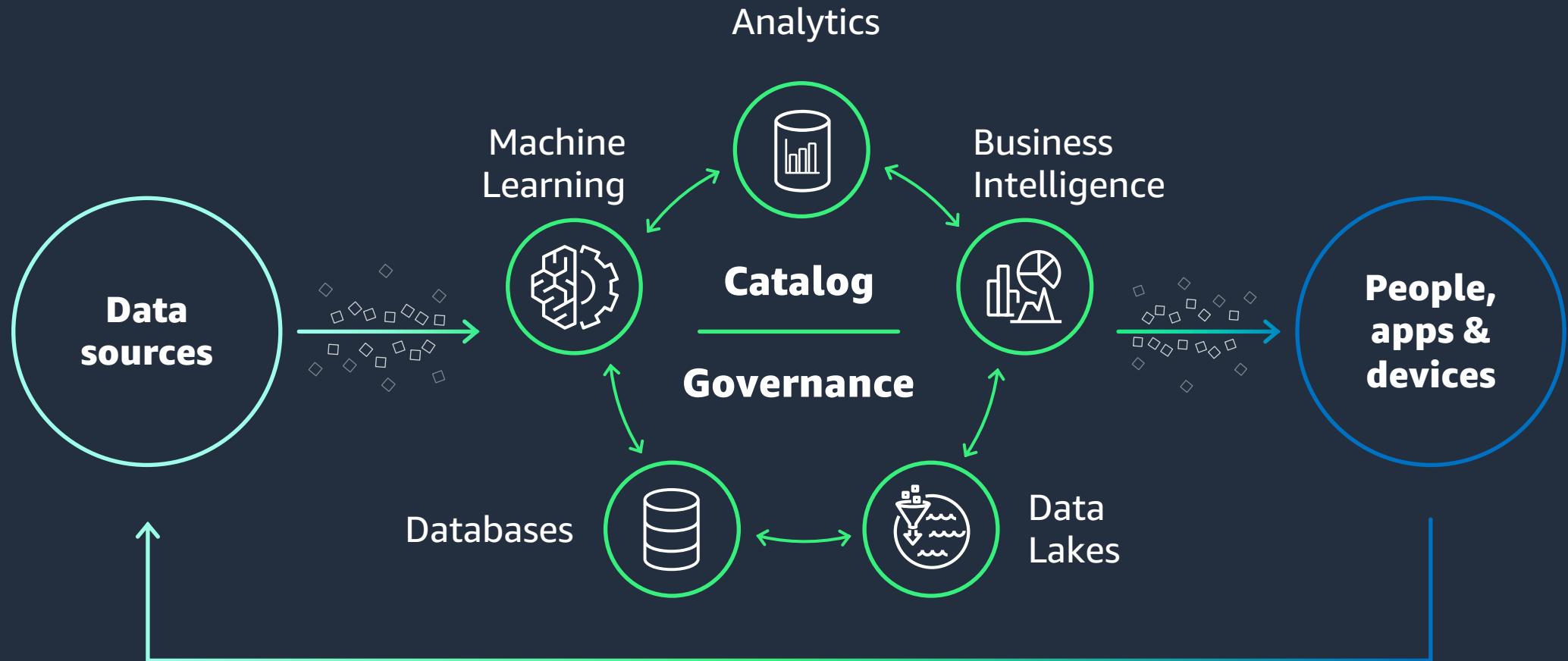
## UNIFY

Data by breaking down silos and with secure, well-governed data access

## INNOVATE

By inventing new experiences and reimagining existing processes with HCLS industry-specific services

# End-to-end data strategy in action



# HCLS Value Chain with AWS



© 2023, Amazon Web Services, Inc. or its affiliates.

# Why HCLS organizations innovate with AWS

LEADING HEALTHCARE & LIFE SCIENCES ORGANIZATIONS LEVERAGE AWS TO:



## Accelerate time to discovery & market

AWS delivers the highest performance for machine learning and high-performance computing in the cloud.



## Reduce costs & streamline operations

AWS offers a robust portfolio of cost savings tools and services, and offers flexible tiered pricing models.



## Seamlessly scale to meet changing needs

AWS offers the most extensive global infrastructure.

## Access the largest partner network

AWS for Life Sciences features dozens of vetted life sciences technology and consulting partners.



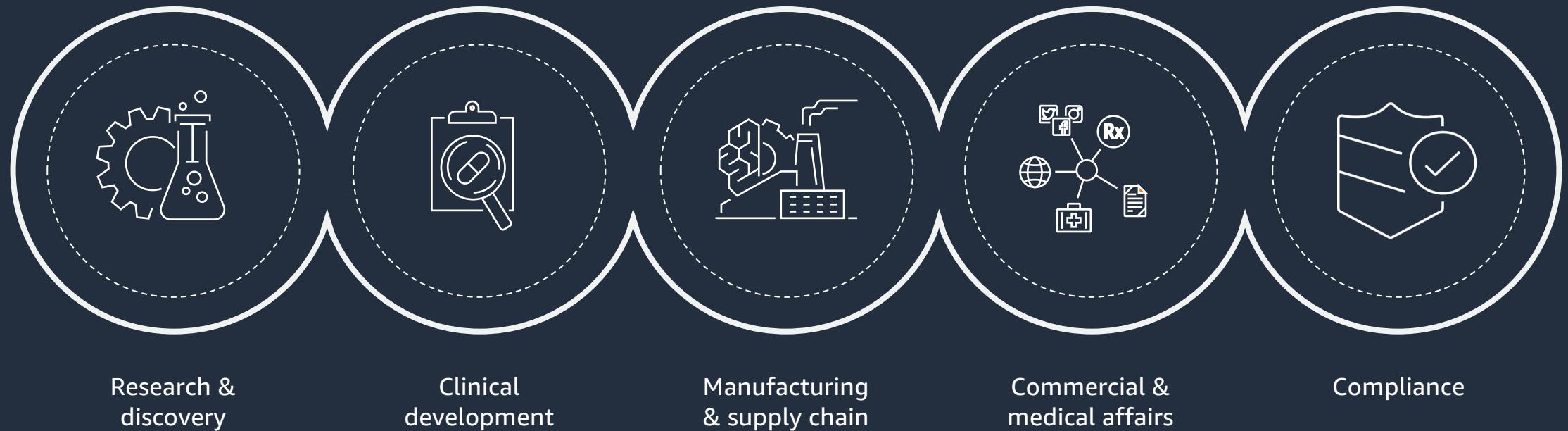
## Raise the bar on security & compliance

AWS supports the most security standards and compliance certifications, including HIPAA.

## Reduce barriers to innovation

AWS for Life Sciences provides a curated portfolio of industry tools and solutions for the builder and the buyer.

# Supporting innovation & operational excellence across the value chain





# Research & discovery



Research &  
discovery



Clinical  
development



Manufacturing  
& supply chain



Commercial &  
medical affairs



Compliance

## Most common customer support areas:

Automating repetitive tasks to increase bandwidth for high-value activities

Handling, storing, and documenting data in accordance with industry regulations

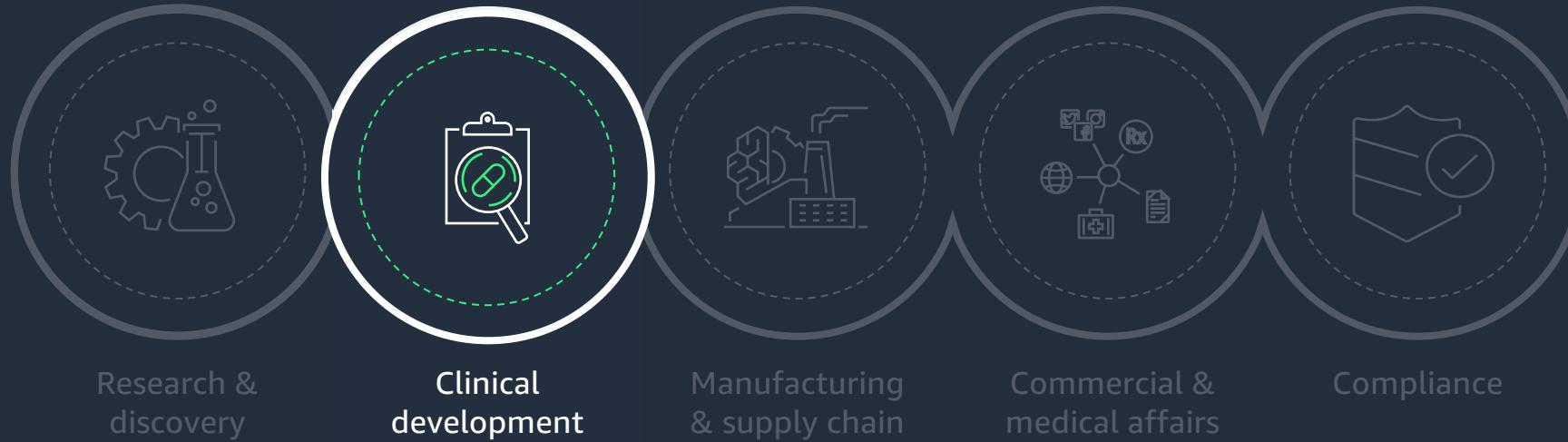
Facilitating secure collaboration internally and with third parties

Developing connected Labs of the Future

Processing growing volumes of data with new applications like Cryo-EM and next-generation sequencing



# Clinical development



## Most common customer support areas:

Conducting remote clinical trials and integrating vast amounts of wearable device data

Optimizing clinical trial recruitment, protocols, study locations, and patient experience

Collaborating with investigators, contract research organizations (CROs), and sponsor organizations

Automating and optimizing regulatory submission workflows



# Manufacturing & supply chain



## Most common customer support areas:

Breaking down silos throughout the supply chain to enhance operational forecasting

Connecting instrument data to improve shop floor visibility and predict site performance

Adapting legacy processes to enable manufacturing of large molecule drugs

Identifying opportunities for optimization, cost savings, and working capital improvements

# Smart Factory Use Cases



OEE visualization



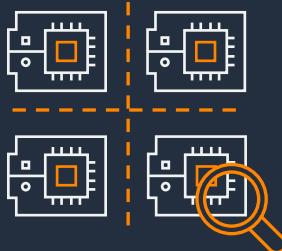
Production/Process optimization



Preventive/predictive maintenance for machines



Machine as a service



Computer vision for quality control



Automated material management

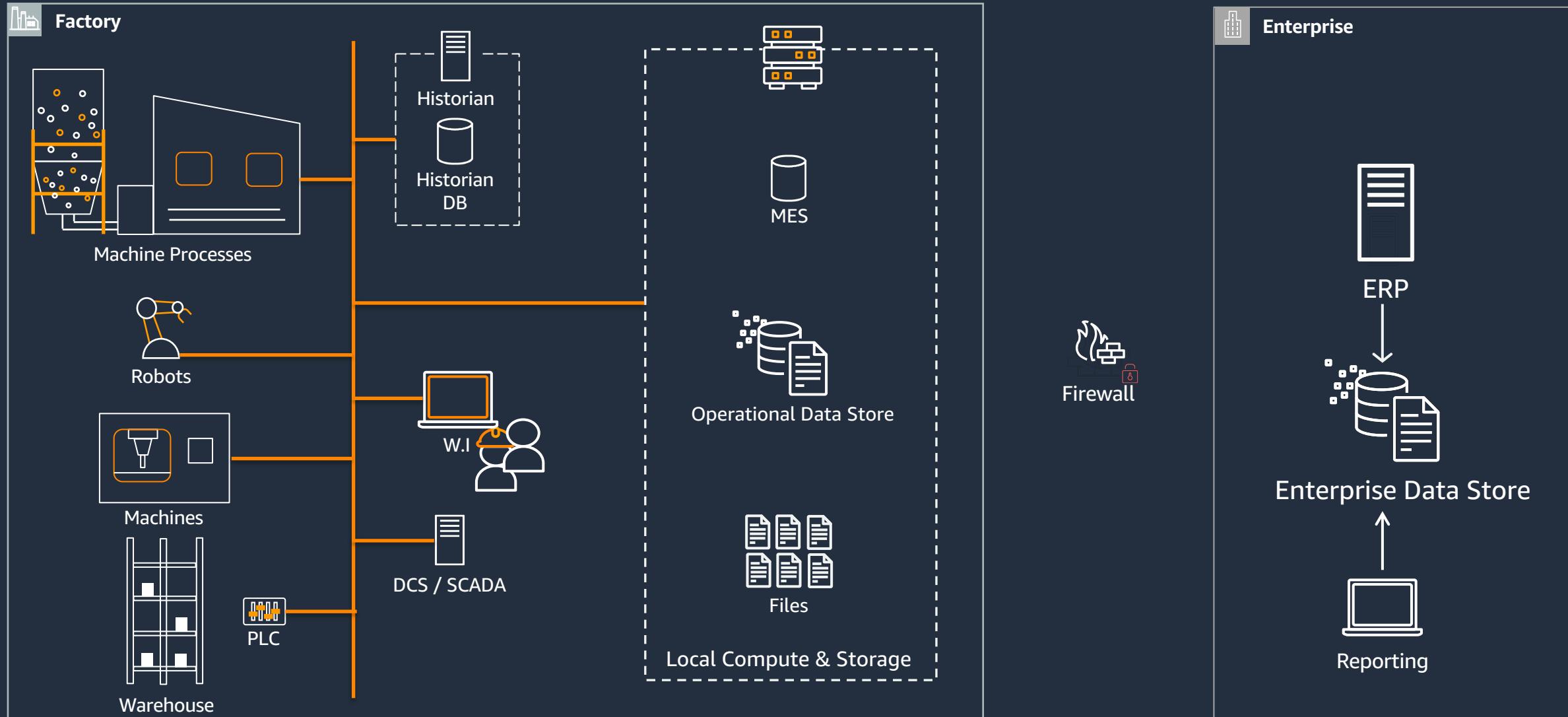


Track & Trace

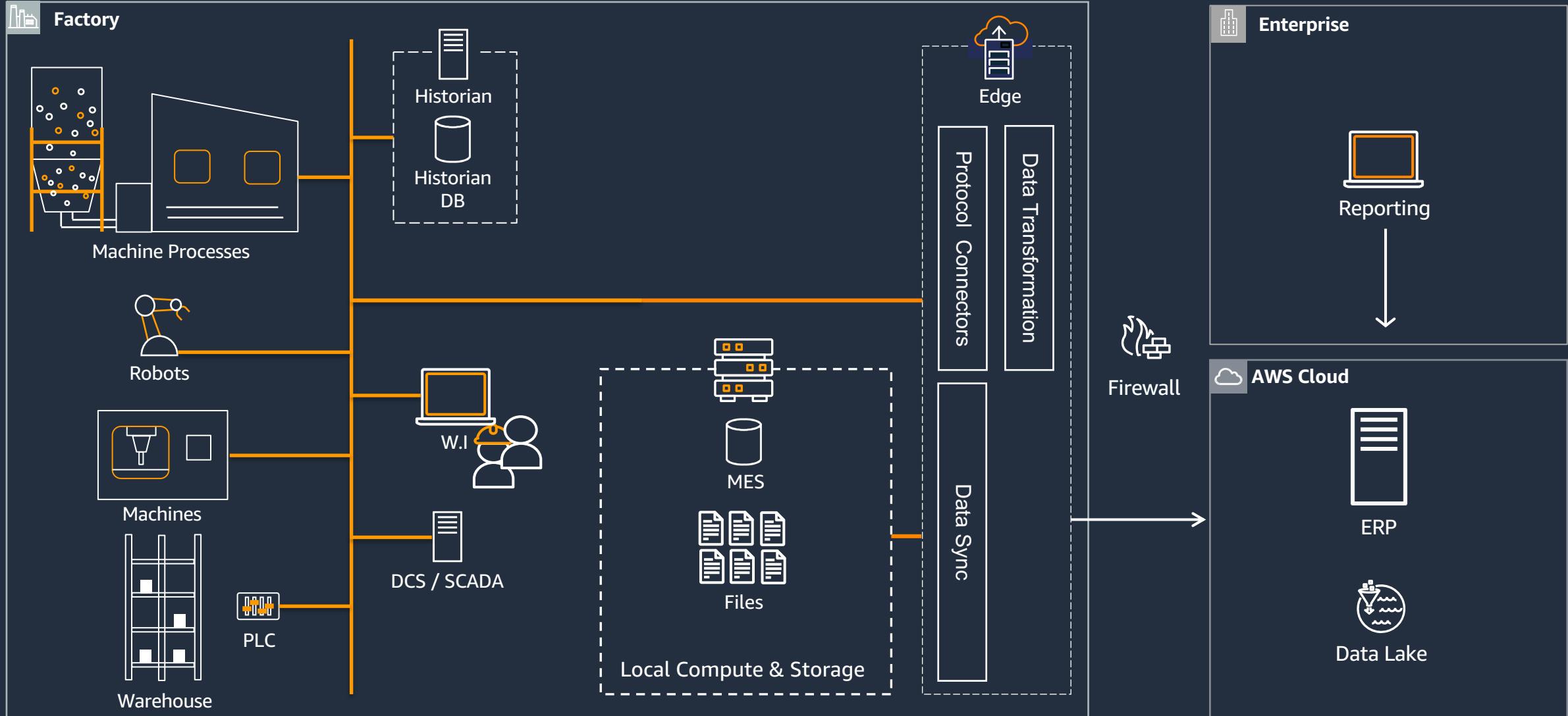


Digital Twin

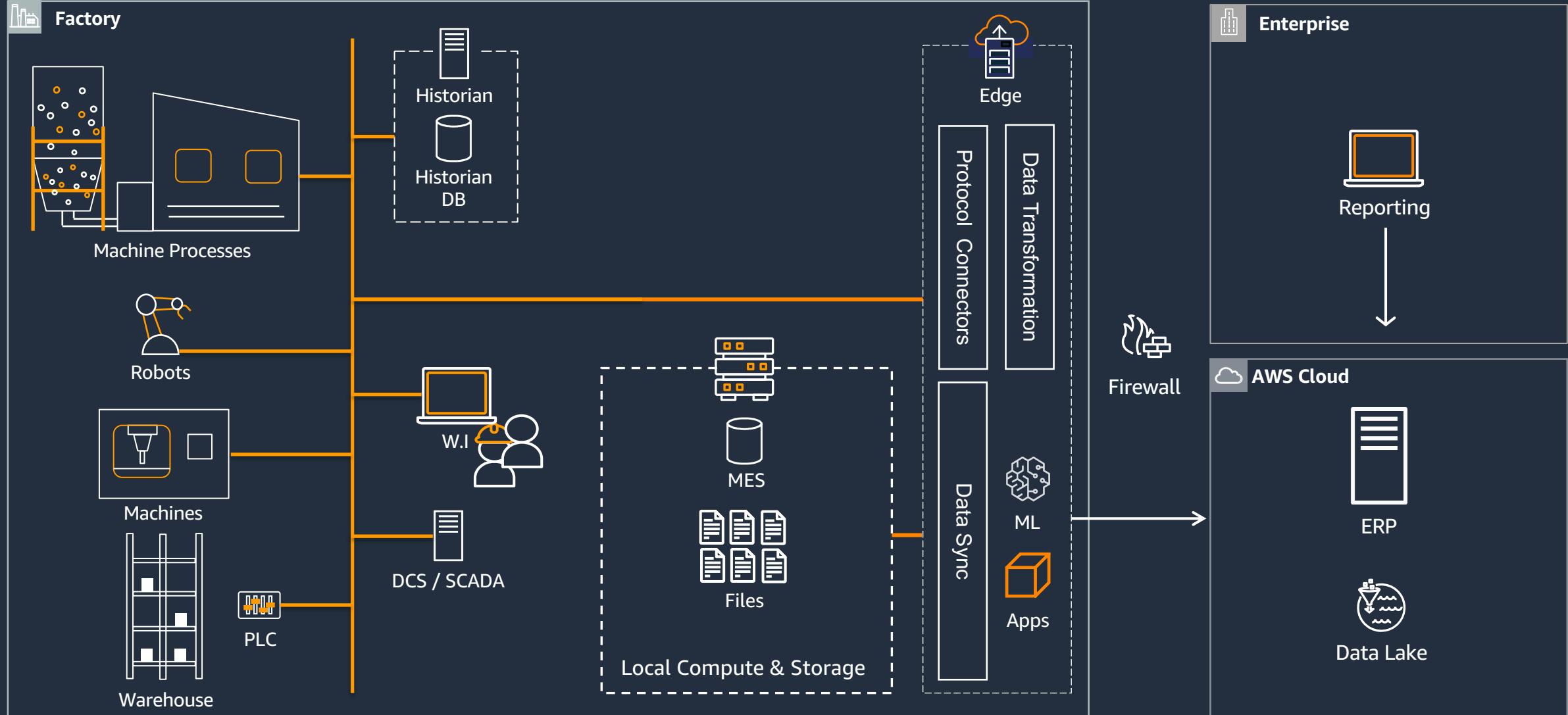
# Typical Factory



# Hybrid manufacturing



# Hybrid manufacturing



# Novartis reinvents pharma manufacturing using AWS

## Challenge:

Novartis wanted to improve its manufacturing operations by developing standard metrics for global site efficiency, viewing global operational performance through a “single pane of glass”, and building advanced machine learning (ML) models to predict site performance.

## Solution:

Novartis built their “Insight Centers” using AWS to provide interactive operational information to both site operators and corporate users around the globe. The platform integrated all their manufacturing sites to provide real-time information on production capacity, product traceability, inventory levels, and proactive maintenance. ML models optimized supply chains and eliminated redundancies between facilities, saving the company millions of dollars globally.

## Benefits:

- Improved operational forecasting and machine failure predictability
- Developed digital twins to enable faster decision-making
- Created dynamic views of the global manufacturing processes that were previously un-achievable
- Built a robust security posture and simplified access and entitlement management
- Enabled the manufacturing of small-batch personalized medicines



**“Insight Centers on AWS allow us to look at our whole value chain from the start to the end, from how we source our start material, how to do demand forecasting, how we operate on the shop floor, to how we supply to our customers and our patients.”**

[Learn more](#)

# Merck optimizes manufacturing with big data analytics using AWS

## Challenge:

Merck wanted to dig deeper into the reasons behind the higher-than-usual discard rates and low yields on certain vaccines. But this was a time-consuming and complex endeavor, involving manual spreadsheet-based analyses of data collected throughout the manufacturing process, aligning data from disparate sources, and spotting abnormalities.

## Solution:

Merck decided to use cloud-based Hadoop compute, built on AWS, for the analysis. This allowed data from 16 different sources to be analyzed by dropping them into a data lake, without having to transform them with time-consuming and expensive ETL processes for conforming to a rigid, predefined relational database schema.

## Benefits:

- Generated conclusive answers about production yield variance within just three months
- Performed 15 billion calculations and more than 5.5 million batch-to-batch comparisons
- Optimized the production of other vaccines in development



"AWS helped us take all of our data, whether from the labs or the process historians or the environmental systems, and **just drop it into a data lake.**"

[Learn more](#)

# Moderna Therapeutics delivers mRNA drugs faster, at lower cost using AWS

## Challenge:

To bring the new mRNA vaccines to market at scale, Moderna needed to upgrade their ERP systems and redesign manufacturing processes to meet unprecedented demands.

## Solution:

Using SAP S/4HANA in a GxP validated environment using AWS, Moderna built a paperless ERP system for manufacturing and supply chain operations that delivered speed, scale, and cost-optimization. AWS helped streamline production by integrating data from 100+ IoT enabled robotic instruments. A “kit” concept for providing tech transfers to new contract manufacturing sites facilitated their ability to get started in just a few days.

## Benefits:

- Shortened timelines for upgrading ERP systems from five months to just two
- Created a 200,000 square-foot GMP compliant production facility winning the ISPE Facility of the Future Award
- Scaled to deliver vaccines in more than 30 countries, and integrated additional manufacturing sites with a modular, data-driven approach, in days

The Moderna logo is displayed in its signature red font, with a blue dashed horizontal line underneath the word "moderna".

“On the manufacturing side, **everything is fully digitized, paperless, and sits on AWS**—including our manufacturing execution system. The value of our digital investment multiplies with each additional product we make.”

[Learn more](#)



# Commercial & medical affairs



Research &  
discovery



Clinical  
development



Manufacturing  
& supply chain



Commercial &  
medical affairs



Compliance

## Most common customer support areas:

Accelerating real-world  
evidence collection  
and management

Understanding  
patient journey and  
progression patterns

Deploying personalized, omni-  
channel communications to  
engage healthcare professionals  
and customers

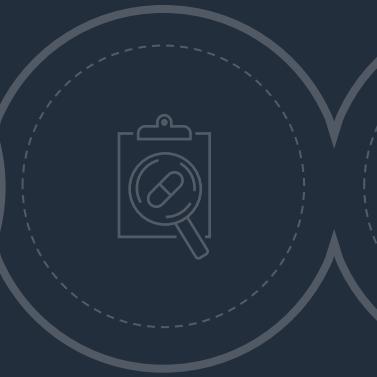
Unleashing actionable  
insights to improve  
patient and provider  
experience



# Compliance



Research &  
discovery



Clinical  
development



Manufacturing  
& supply chain



Commercial &  
medical affairs



Compliance

## Most common customer support areas:

Managing compliance  
with HIPAA, HITRUST,  
and GDPR standards

Automating audit controls  
to enable continuous  
monitoring and alerting

Reducing time to provision,  
configure, and test a GxP  
compliance-aligned  
infrastructure

Securely collaborating  
with CROs and other  
third-party organizations

# AWS for HCLS



© 2023, Amazon Web Services, Inc. or its affiliates.

# Unleash the power of HCLS data



# Modern data architecture

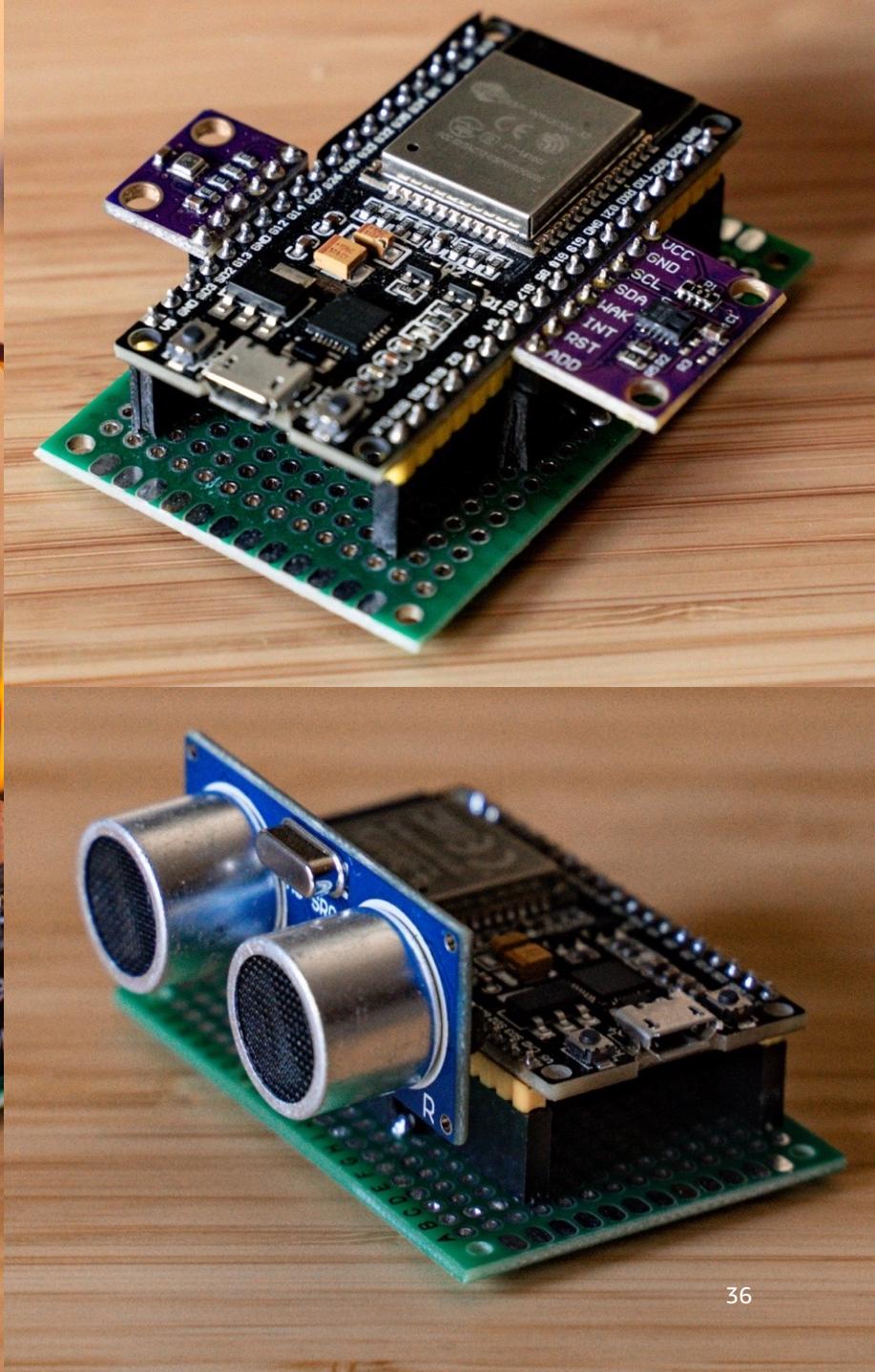
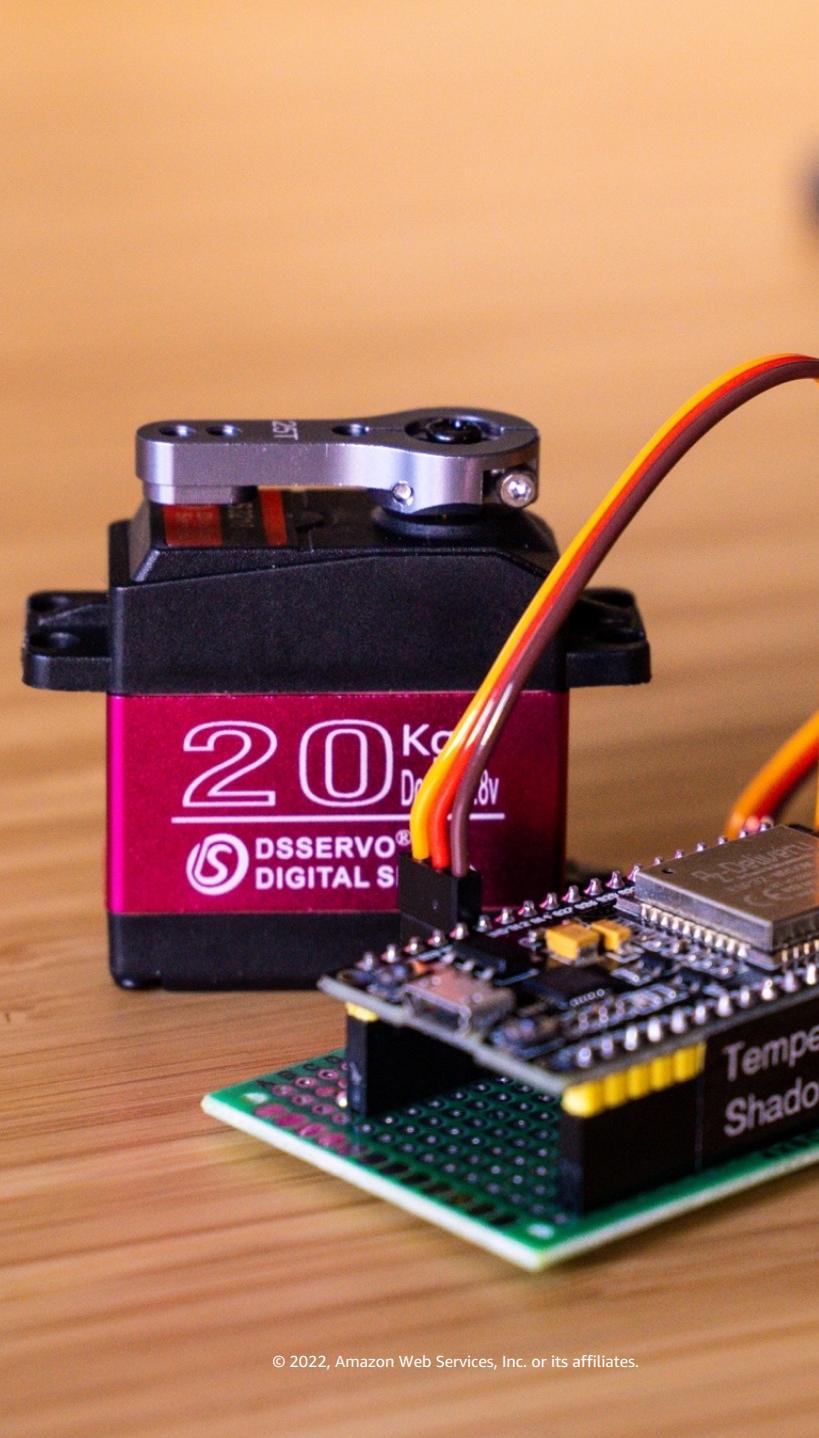
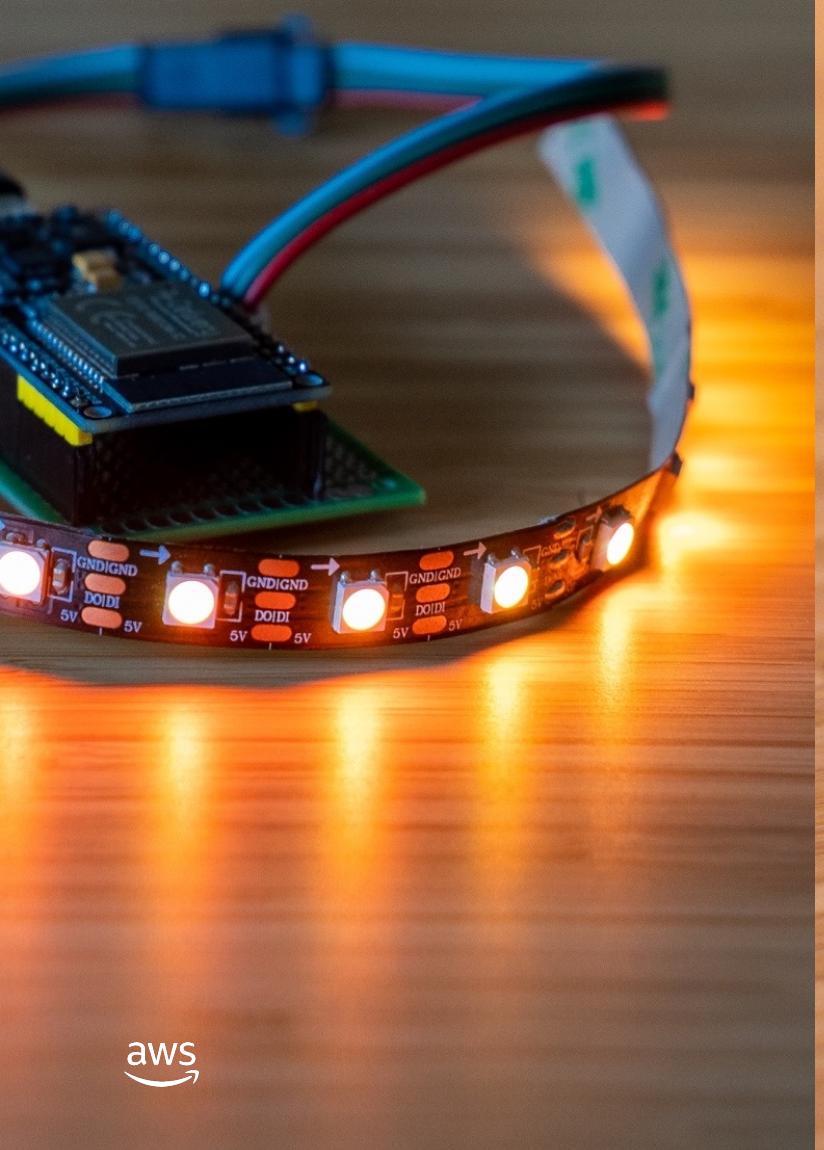


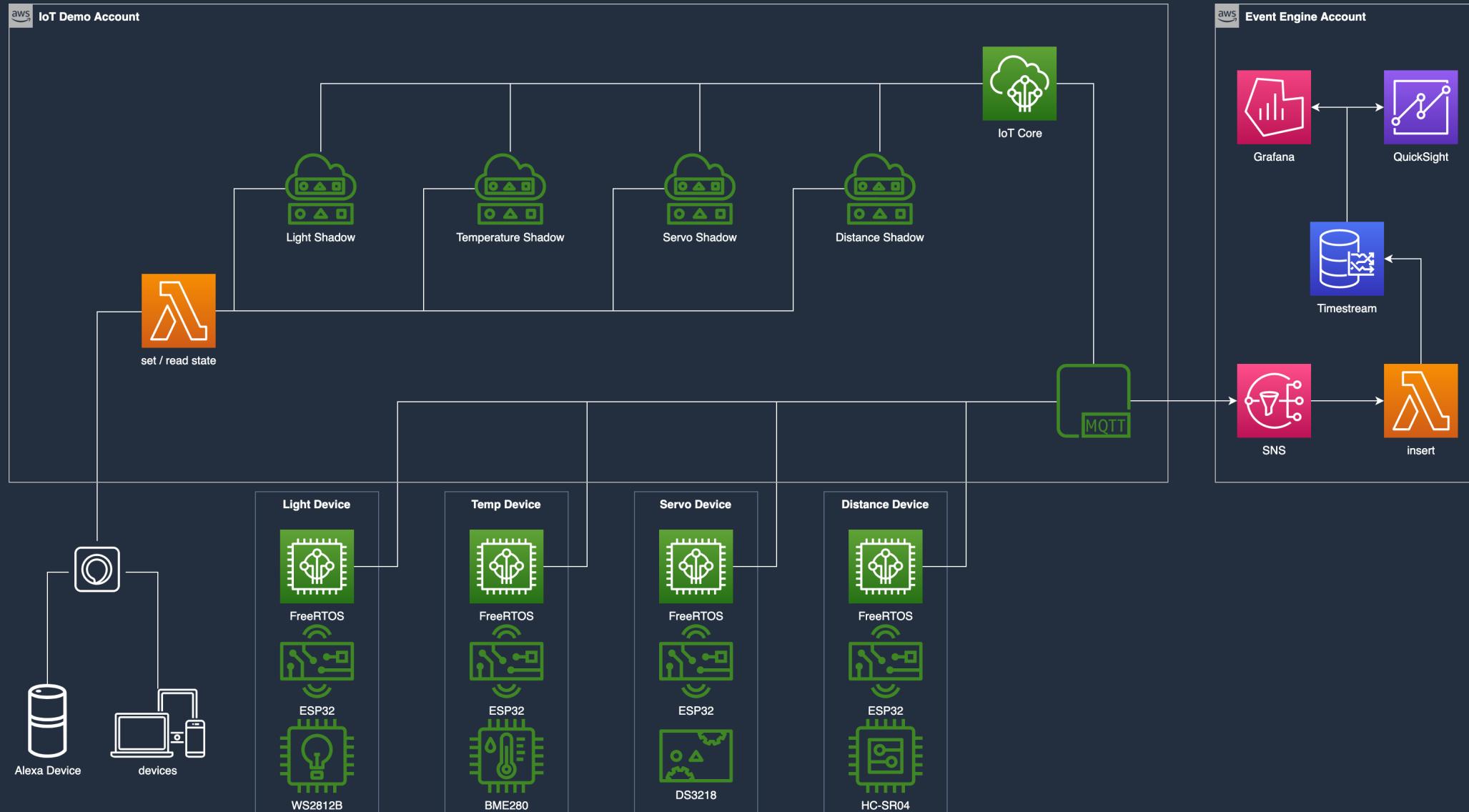
# Modern data architecture on AWS

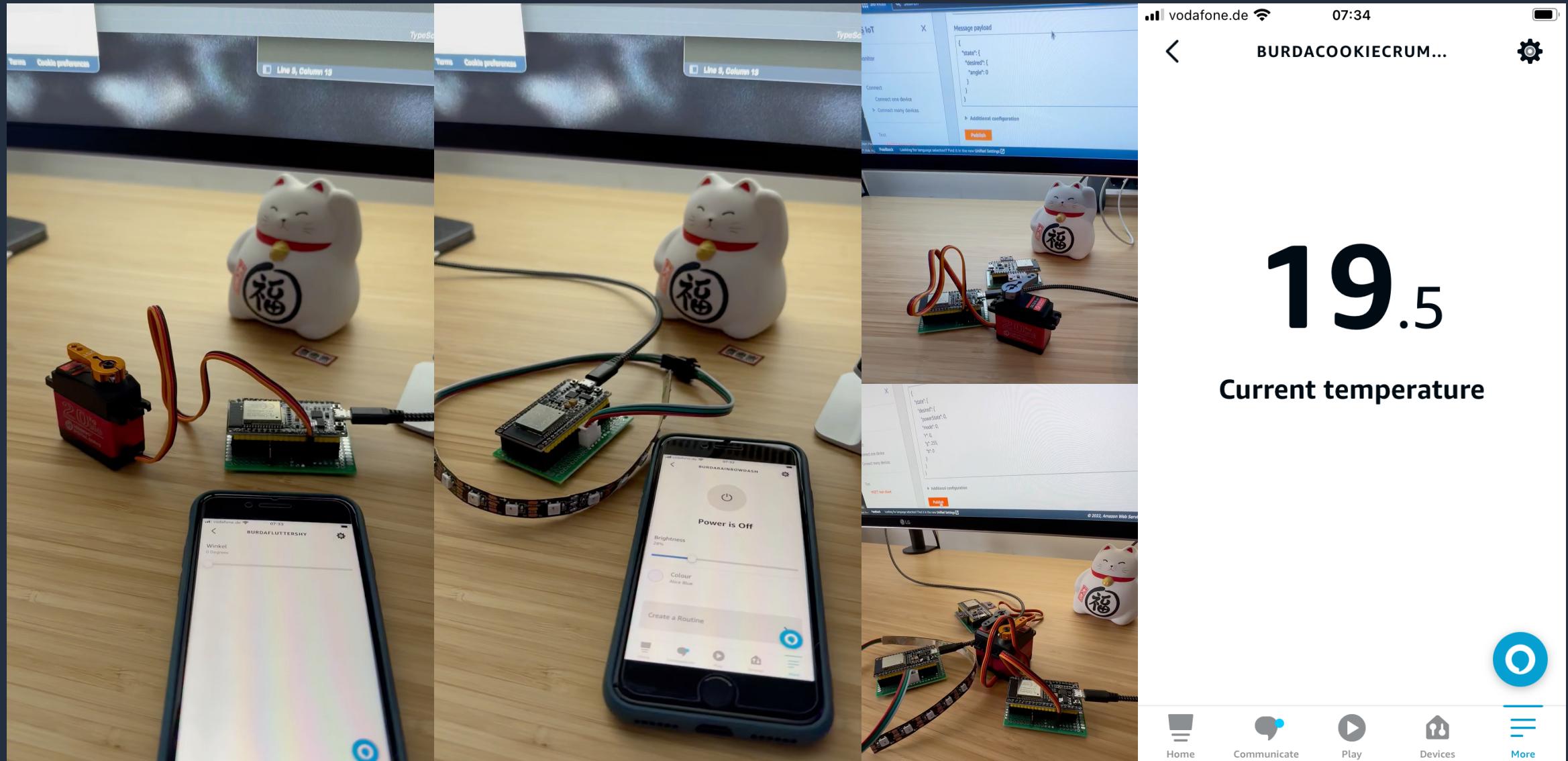


# IoT Demo Time!











# Up-Next

Hands-on-Lab – Data Lake in Action!

<https://dashboard.eventengine.run/>

Event Hash: db3a-1094776d34-d9



## EMEA HEALTHCARE & LIFE SCIENCES WORKSHOPS

<https://aws-experience.com/>

- June 27th: AWS Cloud Fundamentals
- June 28th: Genomic Data Analysis with Amazon Omics
- July 4th: Machine Learning
- July 5th: AWS for Pharma Manufacturing
- July 6th: Security, Encryption & Data Protection Immersion Day
- July 11th: Sustainability
- July 13th: High-performance computing
- July 18th: Compliance in the Cloud



Please complete the  
workshop survey

<https://www.aws-experience.com/emea/dach-cee/event-survey/1217c67a839d-cf28-1e74-f086-9144f7a8>



# Thank you!

**Enno Schulte**

[ennop@amazon.de](mailto:ennop@amazon.de)



enno-schulte

**Estefany Kuong Montalvan**

[ekuong@amazon.es](mailto:ekuong@amazon.es)



estefanykuong

**Monika Nowakowska**

[moninov@amazon.pl](mailto:moninov@amazon.pl)



monika-kordus