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

MFG203

Heineken brews a new connected manufacturing business

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Manufacturing industry

ENABLING TRANSFORMATION WITH DATA

Smart manufacturing



Enable data-driven decisions through automation and digital thread visibility

Smart products and machines



Redefine customer experiences and new business models that increase customer value

Engineering and design



Enable data-driven decisions through automation and digital thread visibility

Supply chain management



Develop connected, transparent, and resilient supply chains that improve customer satisfaction

Sustainability



Demonstrate environmentally conscious operating models while lowering costs

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Prioritized outcomes across common industrial workloads



Engineering and design

- Accelerate time to market
- Lower infrastructure costs
- Improve collaboration
- Secure worldwide collaboration



Smart manufacturing

- Lower costs (energy, machines, labor)
- Improve machine or asset productivity
- Reduce production downtime
- Automate quality inspection
- Improve employee productivity
- Monitor and improve safety



Sustainability

- Reduce wages
- Drive decarbonization and reduce greenhouse gas emissions
- Identify production processes for optimization
- Meet top-line sustainability targets



Supply chain management

- Improve forecast accuracy
- Reduce inventory costs
- Improve capacity utilization
- Improve resiliency



Smart products and machines

- Enhance user experiences
- Create new revenue streams
- Improve product or service quality

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Industrial customers face challenges



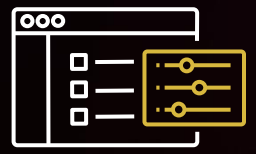
Data access

Integrate data from new and legacy equipment using different protocols



Real-time decision making

Operate at the edge with minimal tolerance for latency



Data management

Organize large amounts unstructured, disparate machine data



Security

Keep operational assets and data secure

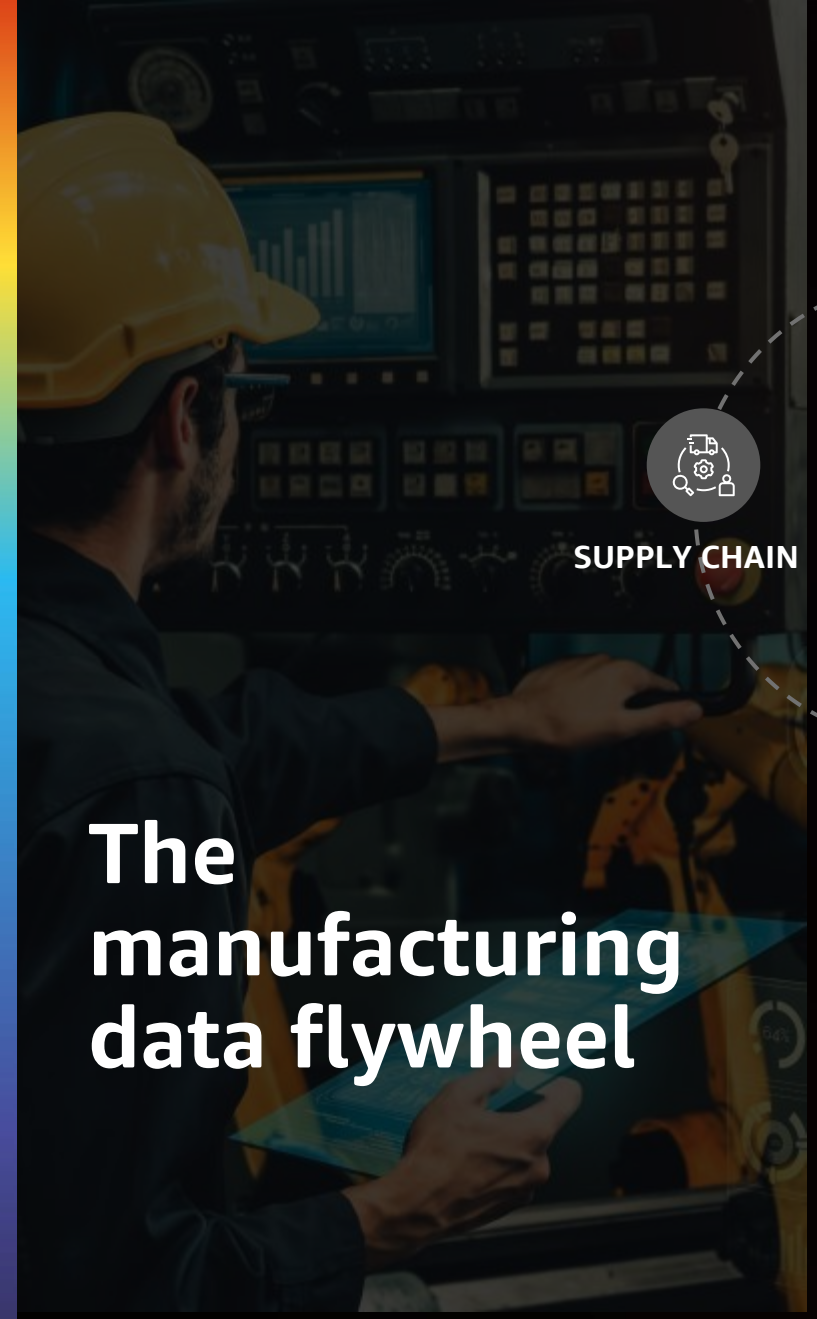


Scale

Manage assets, device fleets, and data across sites

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The manufacturing data flywheel

SUPPLY CHAIN

Improved factory operations improves the product

Smart factory

Yield

Quality

OEE

Uptime

Smart product & services

Lifecycle management

Improvements & updates

Loyalty

Customer satisfaction

LOWER COSTS
INCREASE REVENUES
IMPROVE SUSTAINABILITY

Efficient product and process design improves factory operations

Product performance and usage data improves product and process design

SUPPLY CHAIN

SUPPLY CHAIN

Engineering & design

CAD/CAM/EDA

NPI

Lower changeover time

Process optimization

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Achieve business outcomes faster for industrial customers

Offering multiple pathways to a successful digital transformation



 **Build**	AWS Services and Solutions
 **Engage**	AWS Partners and AWS Professional Services
 **Deploy**	AWS Partner Solutions

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BUILDING ON

A growth company, innovating and pioneering in the beer industry

HEINEKEN brand present in over 190 markets

OpCo centric, entrepreneurial model driven by 70+ countries



A STRONG FOUNDATION

HEINEKEN values quality and people-centric culture

HEINEKEN employs 84,000+ employees

Our long-term focus rooted in our 157 year history

BEST-CONNECTED

- CONSUMERS
- CUSTOMERS
- EMPLOYEES

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INTELLIGENT SUPPORT OF SHOP FLOOR IN THEIR INCREASINGLY COMPLEX WORK



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THE PLATFORM



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CONNECTED BREWERY

OUR BEST FAILURES

FIRST ATTEMPT IN LEARNING

JOINT VENTURE WITH OEM



DIGITAL TWIN WITH DATA SCIENCE SCALE UP

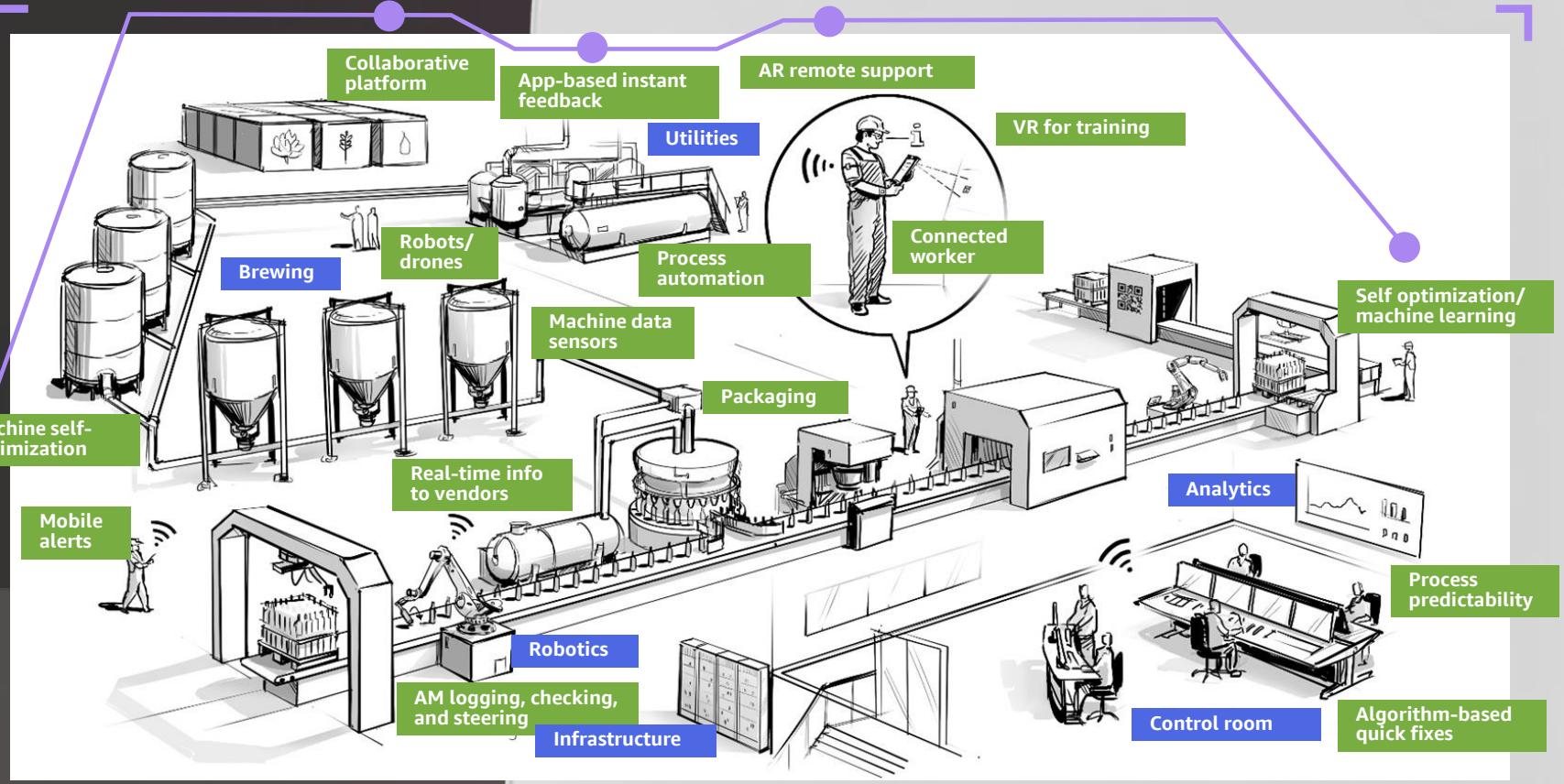


HOW TO MAKE A CONTRACT WITH A STARTUP



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USING A UNIQUE **HEINEKEN**-OWNED DATA LAYER, FULLY SCALABLE TO INCLUDE DATA FROM ANY SOURCE



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FROM EXPERIMENTATION TO VALUE AT SCALE

53
IoT connected breweries

17,000+
Connected workers

2,126
Connected machines

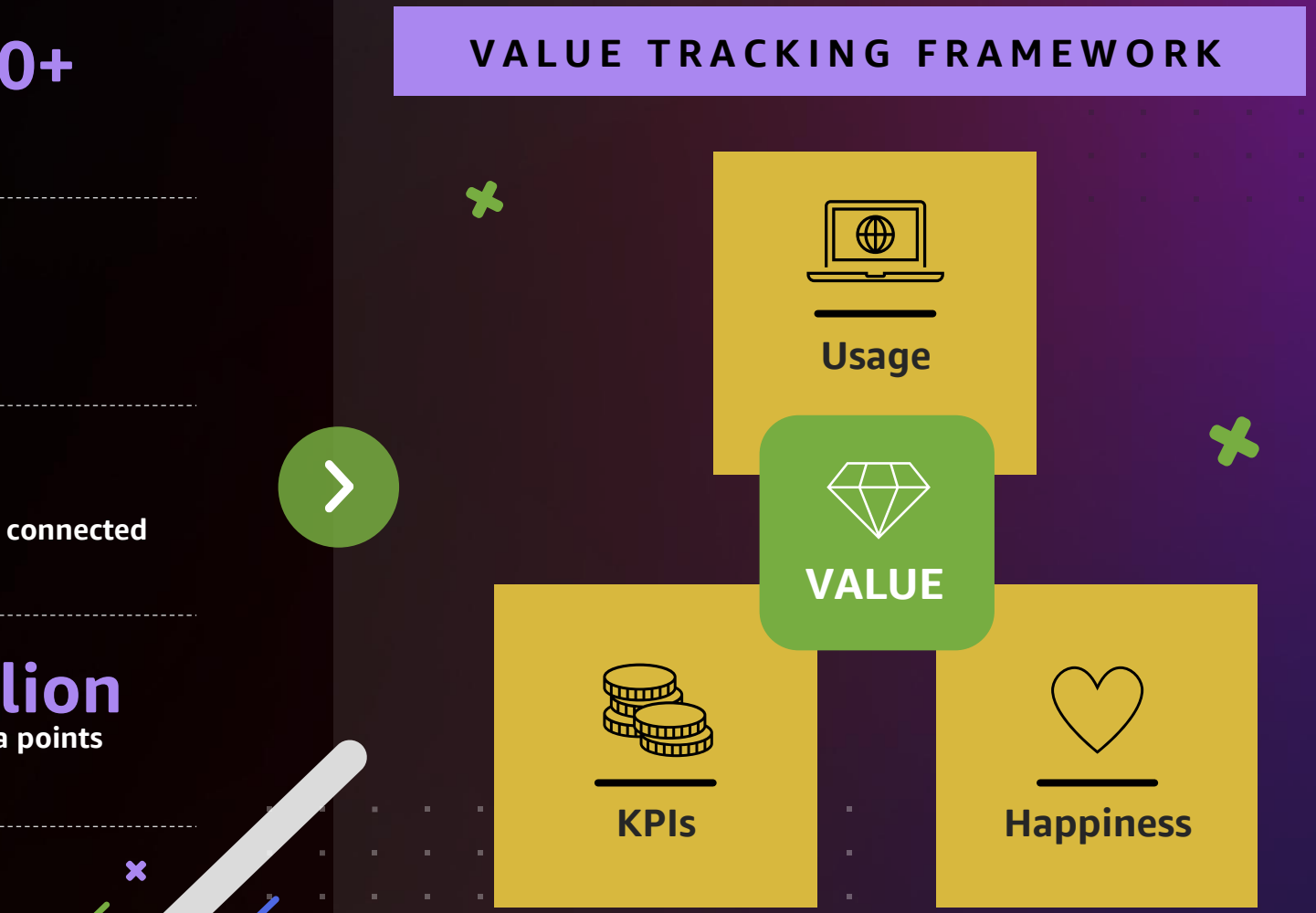
3
Lighthouse breweries

70+
Dashboards Insights

160+
Breweries on connected worker apps

173,068
Data points (tags)

70 billion
Ingested data points



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HEINEKEN

BUSINESS VALUE

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DATA
Connected brewery
Raw data monitoring

INFORMATION
Connected brewery
Descriptive/diagnostic analysis

INTELLIGENCE
Connected brewery
Predictive/prescriptive analysis

80% | **20%**

Raw data [Monitoring]	**Descriptive** [Reports]	**Diagnostic** [Interactive dashboard]	**Predictive** [Machine learning/ artificial intelligence]	**Prescriptive** [Recommendation and automation]	**Adaptive** [Insights and close the loop]
WHAT IS HAPPENING?	WHAT HAPPENED?	WHY DID IT HAPPEN?	WHAT MIGHT HAPPEN?	WHAT COULD WE DO?	WHAT SHOULD WE DO?

ACT FASTER | FIND OPPORTUNITIES FOR IMPROVEMENT | ACT PROACTIVELY

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HEINEKEN

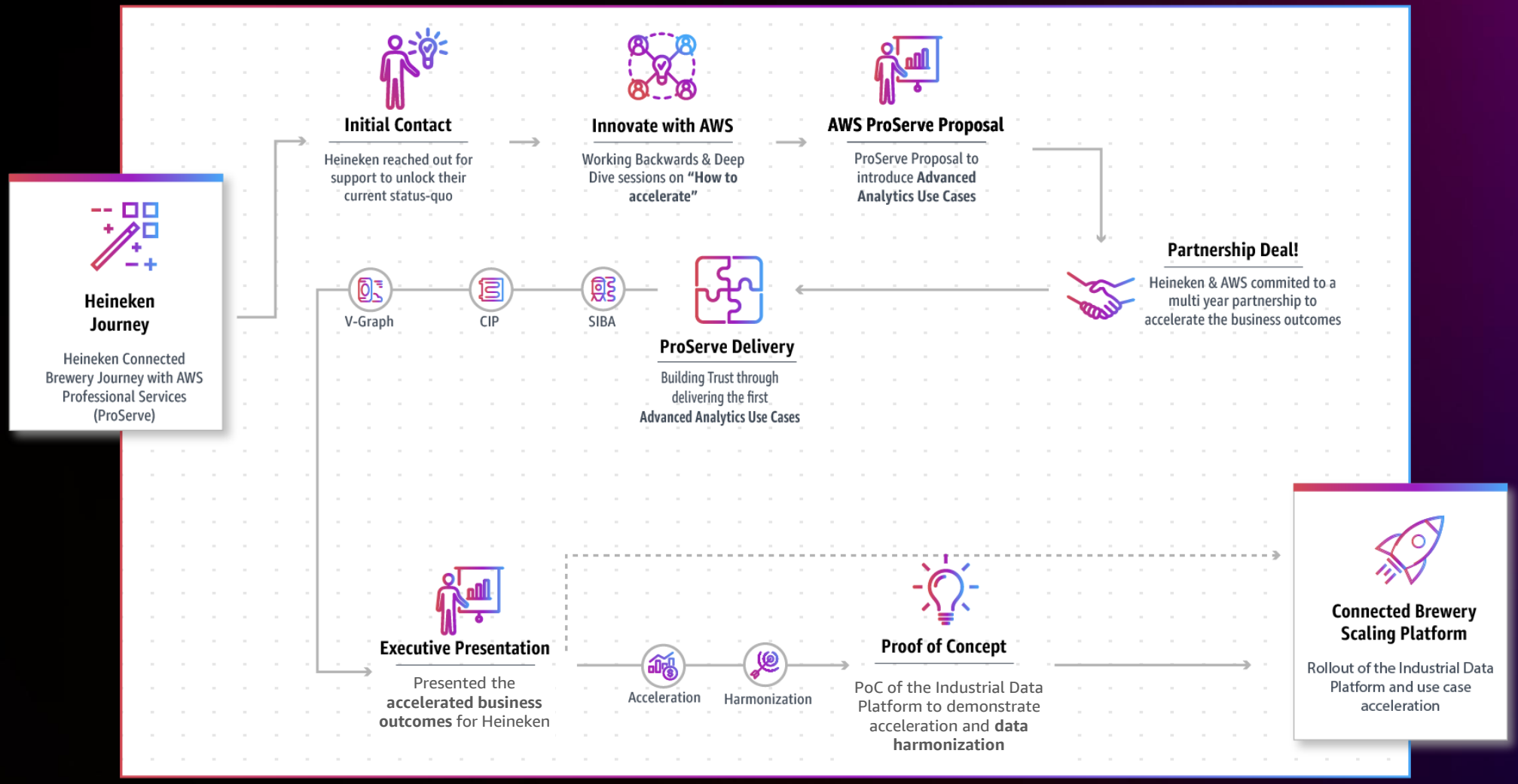


Accelerating with AWS

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Accelerating with AWS

JOURNEY SO FAR



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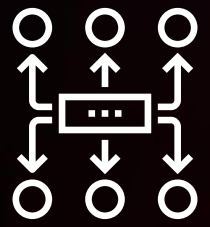
Advanced use case acceleration

INTRODUCE NEW AI/ML AND ADVANCED ANLAYTICS CAPABILITES



PRODUCTION

Mashing process optimization



UTILITIES

Heat exchanger clean-in-place optimization



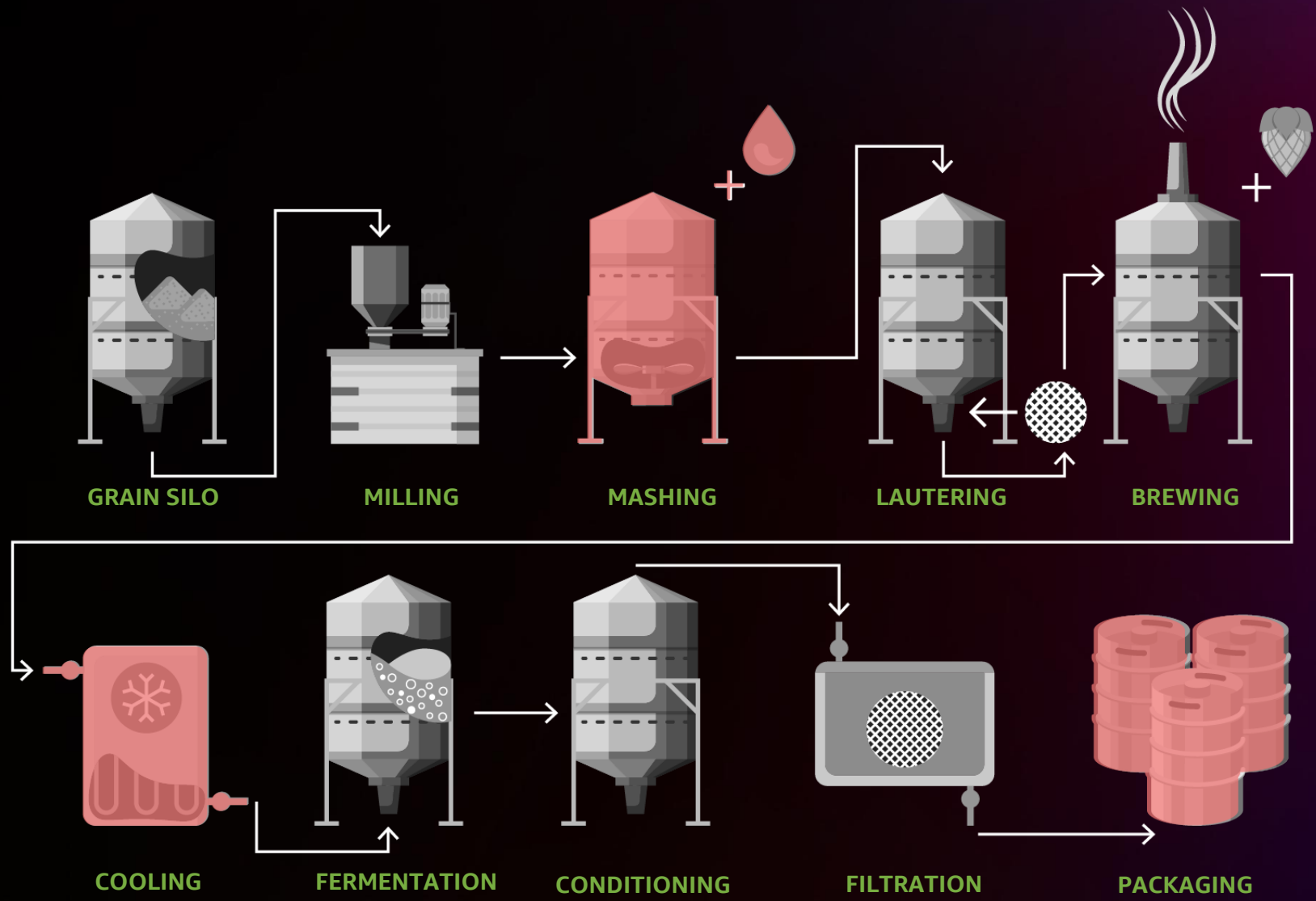
PACKAGING

Line balancing and v-graph optimization

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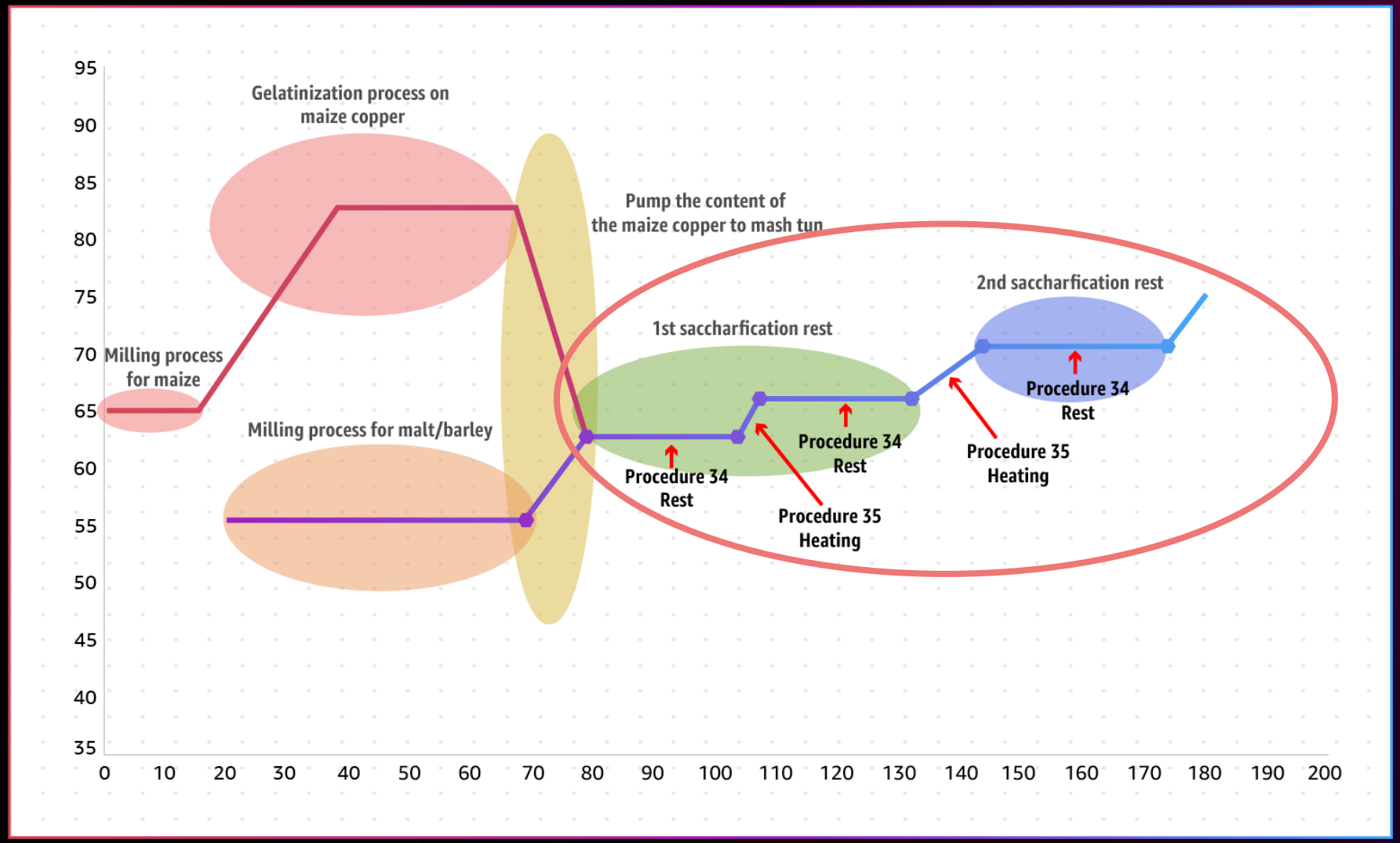
Advanced use case acceleration



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Mashing process

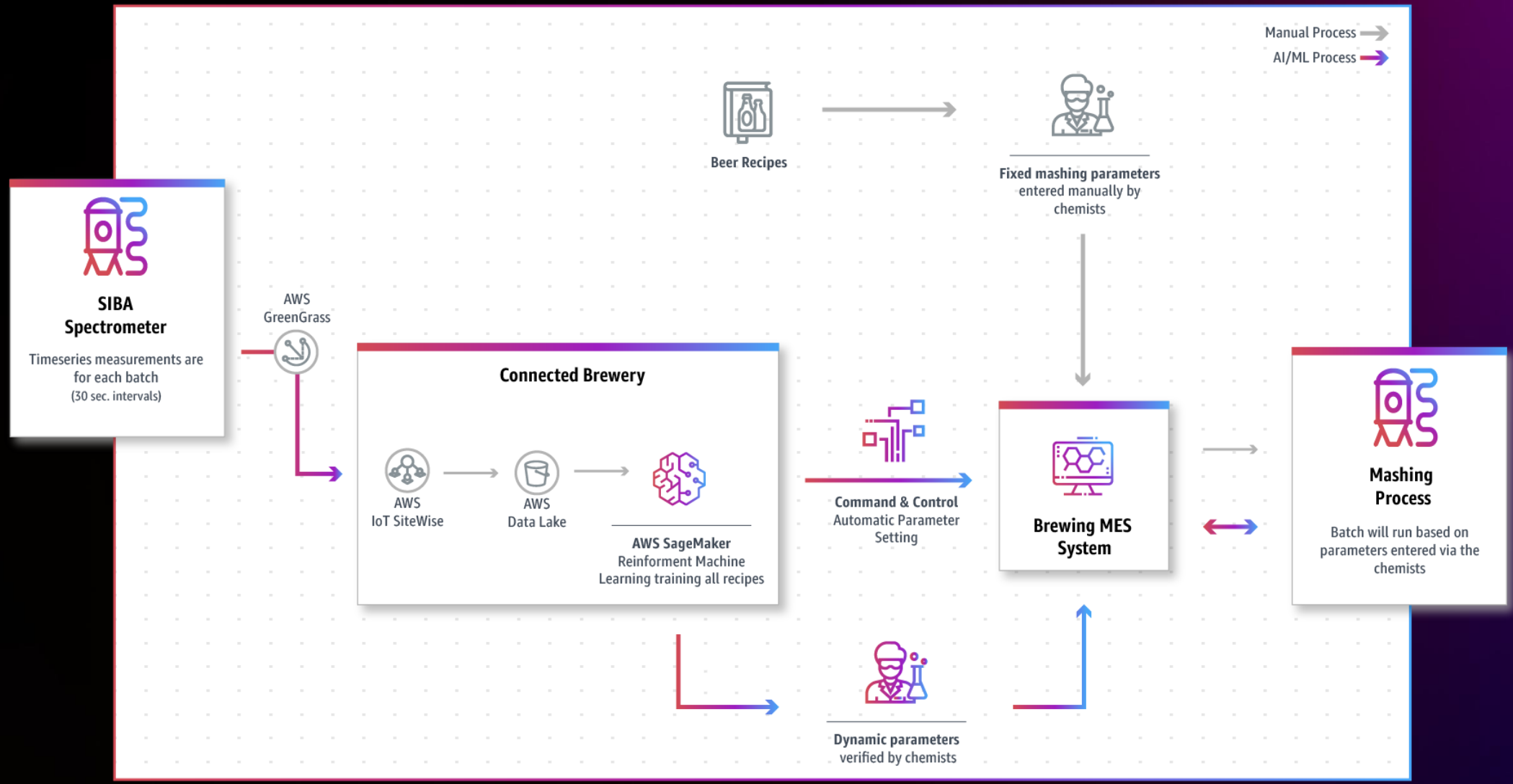
RECIPE WITH MAIZE



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Mashing process optimization

AI/ML AND COMMAND AND CONTROL



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Mashing process optimization

BREWING AUTOMATION

Machine learning technology helps improve the mashing process by automatically adjusting parameters to optimize recipes



>350,000 hl
of beer produced using AI/ML models



11.2%
decrease in extract losses



$90K
in savings per brewery



$14M
scaling potential*

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*Final numbers yet to be confirmed

Heat exchangers

MAINTAIN EFFICIENCY & ENERGY CONSUMPTION

Goal

- Decrease cleaning frequency and energy usage
- Optimize the cleaning parameters for waste management and improved efficiency of the cleaning process



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*Final numbers yet to be confirmed

Heat exchangers

CLEANING IN PLACE

Using machine learning to decrease production downtime and utility usage by predicting when the next cleaning of the heat exchanger takes place



~$50–100K

cost savings per brewery



$21M

scaling potential*

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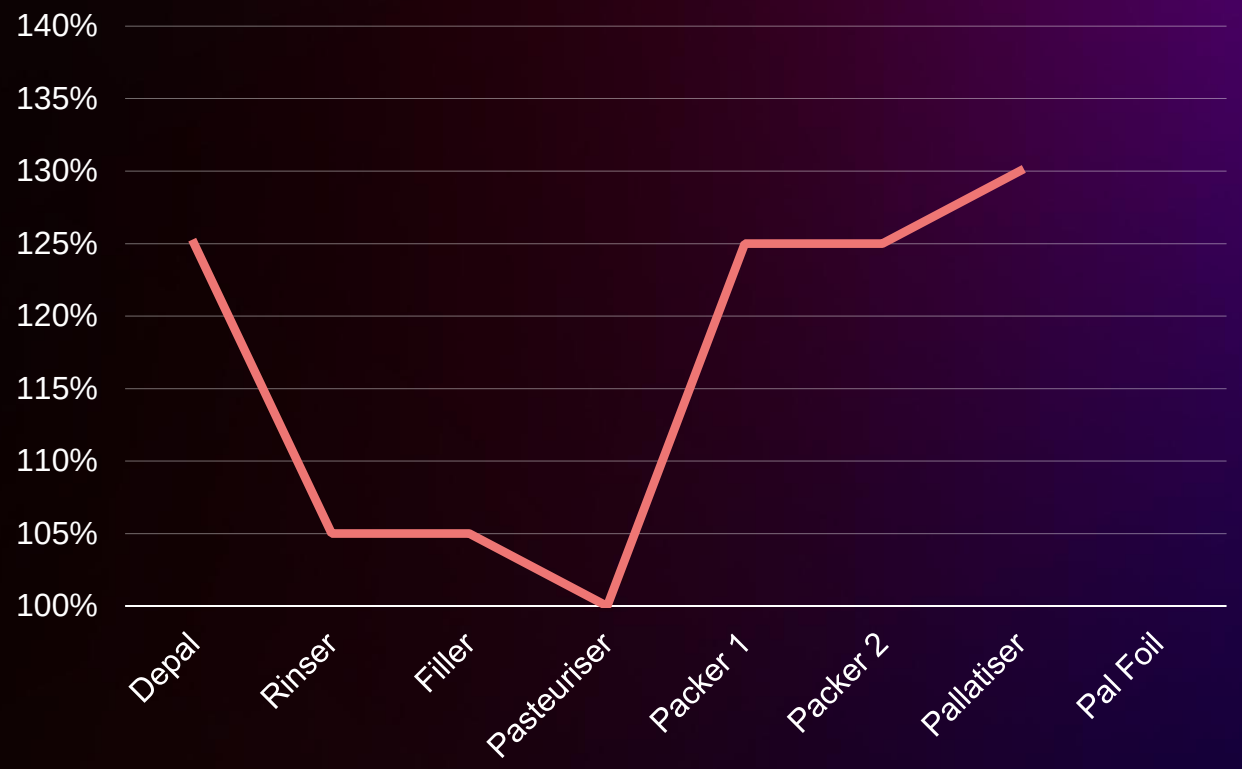
*Final numbers yet to be confirmed

V-Graph

MAINTAIN EFFICIENCY & ENERGY CONSUMPTION

Goal

- Optimize the machine set speeds on the packaging line to reduce line imbalance issues
- Improve Performance and Output
- Reduce Utilities



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*Final numbers yet to be confirmed

V-Graph line balancing

COMMAND AND CONTROL

Machine learning models that learn the behavior of the process help minimize stops and speed losses by optimizing the speeds of machines in different packaging lines



2-10%
increased output capacity



$100-300K
in savings per brewery

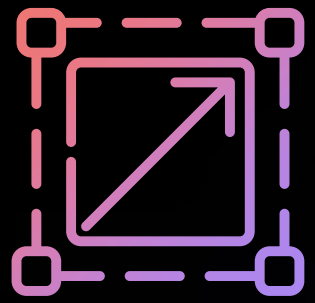


$14-36M
scaling potential*

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*Final numbers yet to be confirmed



How to scale?

INTRODUCING A HARMONIZED INGESTION AND DATA LAYER

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Scaling challenges

FROM OBSERVED CONSTRAINTS

1. **Horizontal scaling challenges**
2. **Platform scaling challenges**
3. **Bespoke technology**
4. **Data harmonization**

TO UNLOCK



Advanced edge and ingestion architecture with auto asset modeling



Data ingestion to accelerate the global rollout of (new) use cases



Move to a managed services model with a low code base



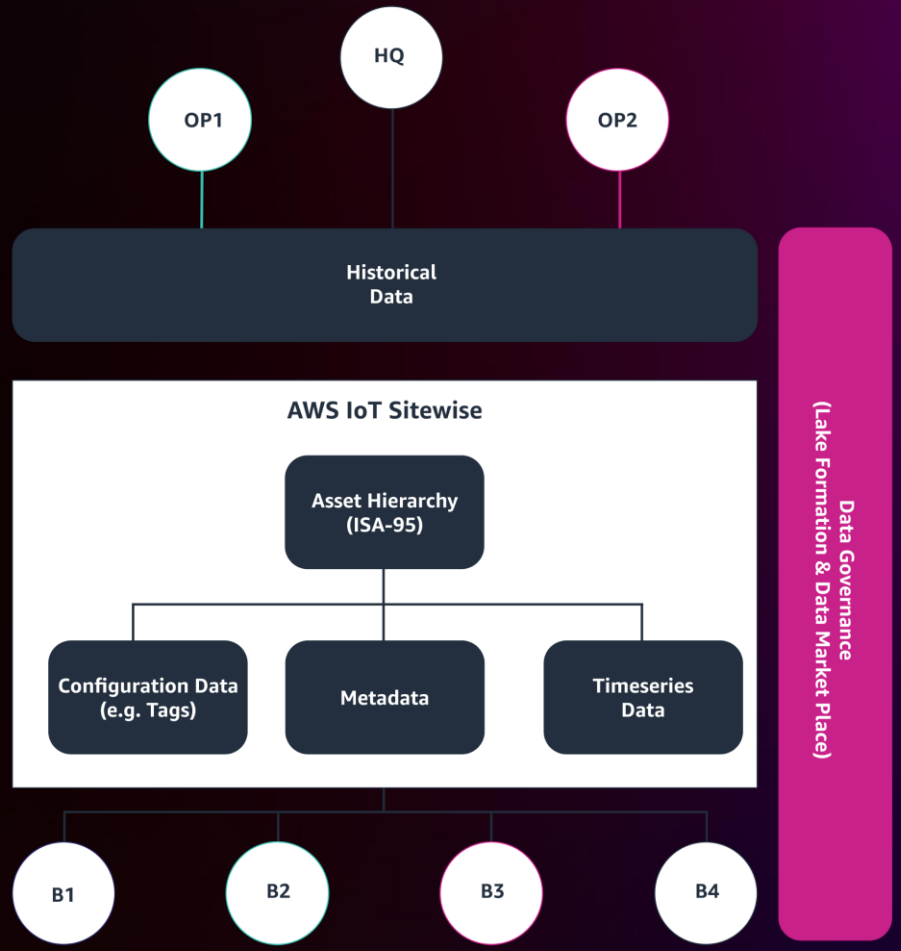
CB Data Platform 2.0 with central data insights and de-centralized ownership

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Managing data at scale with harmonised data layers





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Industrial data platform



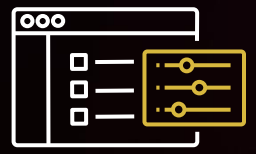
Tag Automation

Automating the industrial data points to AWS IoT SiteWise



Data Contextualizing

Map the tags to the ISA95 & ISA88 standards to create context



Data Harmonization

Leveraging AWS IoT SiteWise to enable context between equipment across the breweries



Data Insights

Leveraging the AWS IoT SiteWise plugin to connect real time data streams to the dashboards & S3



Global Insights & Benchmark

Ask questions about your data and receive answers with visualizations

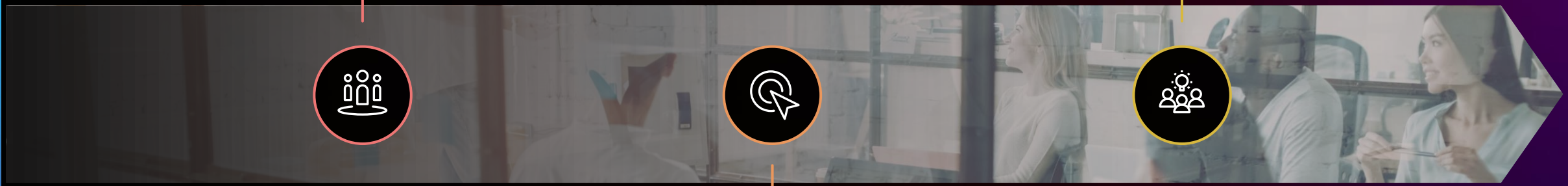
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Next steps

Complete proof of concept

Complete the delivery of the PoC with Heineken to proof data harmonization



Start deployment industrial data platform

Upgrade the existing capabilities to reflect the harmonized data layers and ingestion patterns

Continue to develop advanced use cases

Consider pilot to demonstrate effectiveness; Identify consulting partners as appropriate

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