

# Cognitive Services for Industries

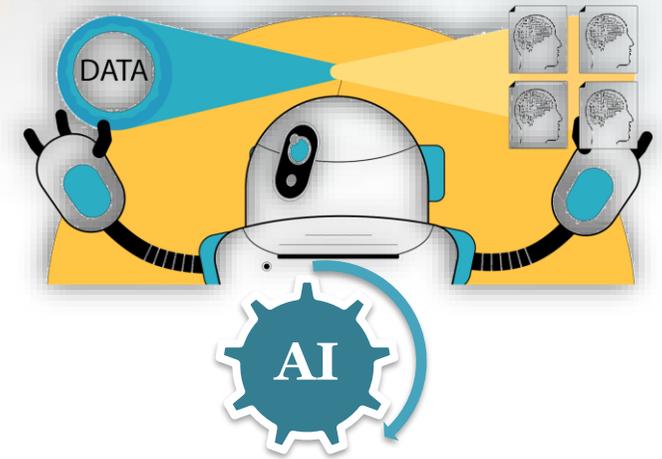
[byteLAKE.com/en/CognitiveServices](https://byteLAKE.com/en/CognitiveServices)

**Advanced quality inspection and data insights**

*AI for Manufacturing, Automotive, Paper, Chemical, and Energy sectors.*

# What is AI?

**Converting DATA  
into  
actionable INSIGHTS  
(information)**



# Streamlined AI Solution Development Process

byteLAKE's expertise in AI, byteLAKE's suite of AI products



## Problem Identification and Solution Exploration



Our journey in developing AI solutions commences by meticulously examining our clients' unique challenges, listening to their problem statements, and brainstorming initial ideas. We work closely with our clients to identify areas where AI can deliver value, generating a comprehensive list of potential AI solutions.

## AI Strategy Workshop



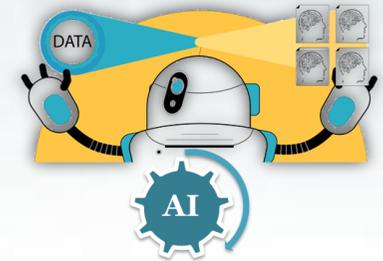
To ensure a clear path forward, we conduct AI strategy workshops, offering our clients a deeper insight into the transformative capabilities of AI solutions. During this phase, we collaboratively chart out deployment plans, meticulously assess the available data resources, and devise strategic activities aimed at guaranteeing the seamless integration of AI into their business operations.

## Proof of Concept Development



At byteLAKE, we understand the importance of a gradual approach. Our AI solutions are developed in a stepwise manner, beginning with a limited functionality proof of concept. This approach allows us to validate our clients' objectives, fine-tune our algorithms, and ensure that the solution aligns perfectly with their needs before proceeding to full-scale development.

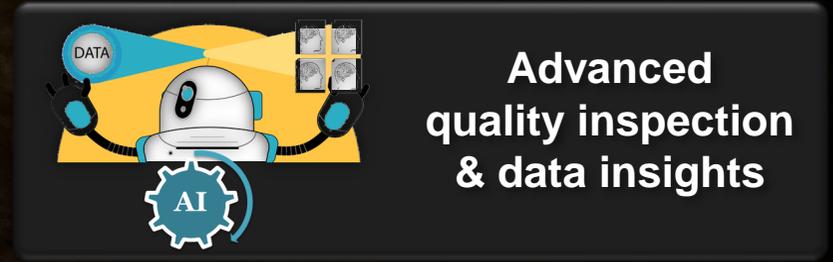
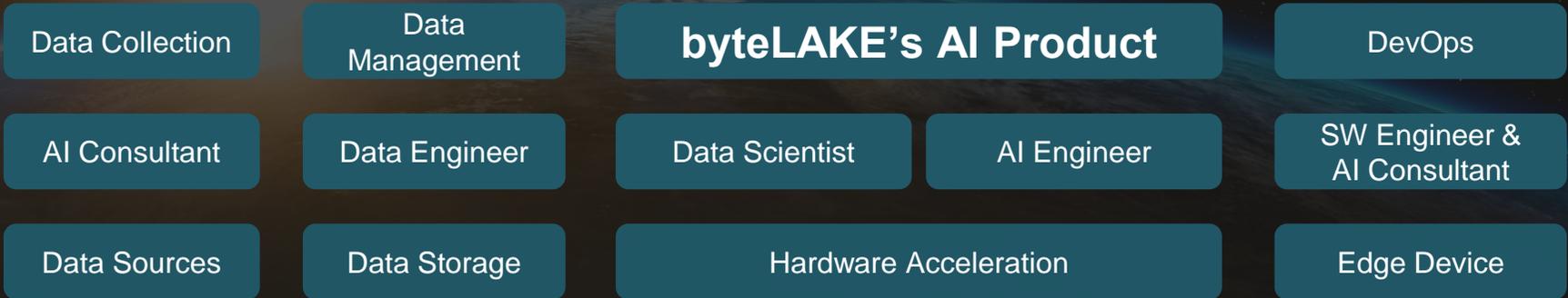
## Tailored AI Solution Deployment



Upon successful completion of the proof of concept phase, we embark on the final leg of deployment. Here, our AI product, meticulously trained, calibrated, and customized to precisely fit our client's unique requirements, is primed for production deployment. This phase underscores byteLAKE's commitment to accelerating time to market, ensuring our clients swiftly realize the transformative benefits of AI within their industries.

# byteLAKE's AI Solutions for Industries

## Optimal Deployment with byteLAKE's AI Products



# Partners & Clients



intel  
partner

Gold  
IoT Solutions

"AI already plays a very important role in our daily lives. [...] The application of the Intel® Distribution of OpenVINO™ toolkit in byteLAKE's Cognitive Services shows that AI works efficiently as an actual tool for optimizing company operations. Moreover, such a combination reduces the barrier of necessary upgrades to IT infrastructure [...]," said Krzysztof Jonak, EMEA Territory Sales Director, Intel.



- [LinkedIn.com/company/byteLAKE](https://www.linkedin.com/company/byteLAKE)
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- [Blog](#)



Microsoft  
Partner



Nicholas Borsotto Machado Monteiro • 1st  
WW AI Business Lead & Head of Lenovo AI Innovators // Co-founder of M...

Professionally and personally I couldn't have asked for better partners than [Marcin Rojek](#), [Mariusz Kolanko](#) and team. Thank you for being with us from the start and allowing us to be your partner for scale. Looking forward to everything that will out next.

## Lenovo AI Innovators

Partner Ecosystem

"We're also **working** with a number of partners **on AI initiatives** that will provide real world solutions for customers. [...] Our **collaboration** with partners such as Intel, NVIDIA, Mark III systems, and **byteLAKE greatly expands the resources and expertise we're able to provide**", said Dr. Bhushan Desam, **Lenovo's AI Global Business Leader, HPC and AI Business.**



byte  
LAKE

"byteLAKE saw the potential to make CFD analysis even faster and more easily accessible leveraging the flexibility and superior parallelism of Alveo accelerator cards," said Viraj Paropkari, senior manager, Data Center Marketing, Xilinx. "Our teams worked together to create finely tuned kernels for Alveo accelerators that are ready to deploy on-premise or in the cloud."

[More at: byteLAKE.com](https://www.byteLAKE.com)

byte  
LAKE

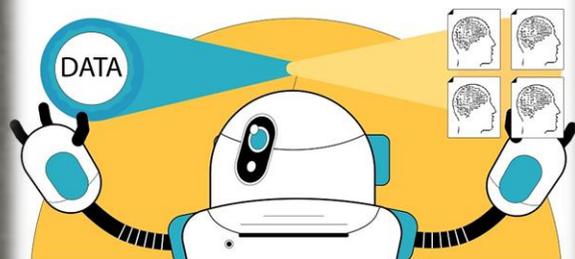


& Partners

AI  
Deployment  
Plan

Case  
Studies

Science +  
business +  
industry know-  
how



# Cognitive Services



for Manufacturing

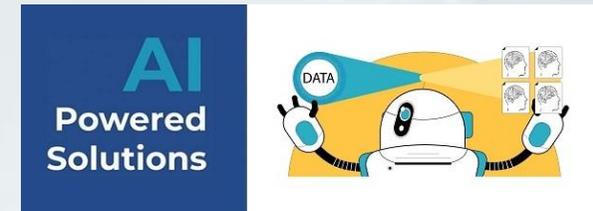


for Automotive



for Paper Industry

## Predictive Maintenance



Data Insights

- **Image analytics** for precise visual inspection
- **Sound analytics** enabling proactive maintenance
  - **Wet line analytics**
- **Seamlessly convert data into actionable insights**, enabling advanced predictive maintenance and risk detection

# Cognitive Services

AI turning data into information

- **Visual Inspection**
    - Products, parts, components, ...
    - Process monitoring
  - **Sound Analytics**
    - Car engines, bearings, ...
    - Assembly line inspection
  - **Data Insights**
    - Predictive maintenance
    - Identify risks
    - Optimize operations
    - Find dependencies
    - Avoid downtimes
- **Ensure High Quality Standards**



Watch on YouTube: [youtu.be/qBtaoIMLedo](https://youtu.be/qBtaoIMLedo)

Download Tech Brief: [bytelake.com/en/download/4400/](https://bytelake.com/en/download/4400/)

# Cognitive Services – key features

## 1. Visual Inspection

- Inspection of products, parts, components, and more.
- Continuous process monitoring for quality assurance.

## 2. Sound Analytics

- Analyzing sound data for detecting issues in car engines, bearings, and across assembly lines.

## 3. Data Insights

- Facilitating predictive maintenance to prevent unexpected downtimes.
- Identifying and mitigating risks proactively.
- Optimizing manufacturing operations through data-driven insights.
- Discovering dependencies within your production processes.

## 4. High-Quality Standards Assurance

- Ensuring adherence to stringent quality standards throughout production.

## 5. Real-time Alerts

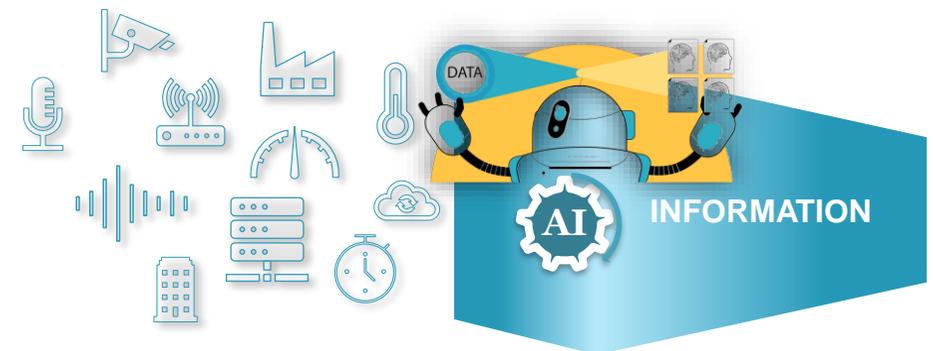
- Providing instant notifications for critical issues, enabling swift action.

## 6. Enhanced Efficiency

- Streamlining operations and reducing waste through data-driven optimization.

## 7. Customization and Scalability

- Tailoring AI models to your specific manufacturing needs.
- Scaling the solution as your production demands grow.

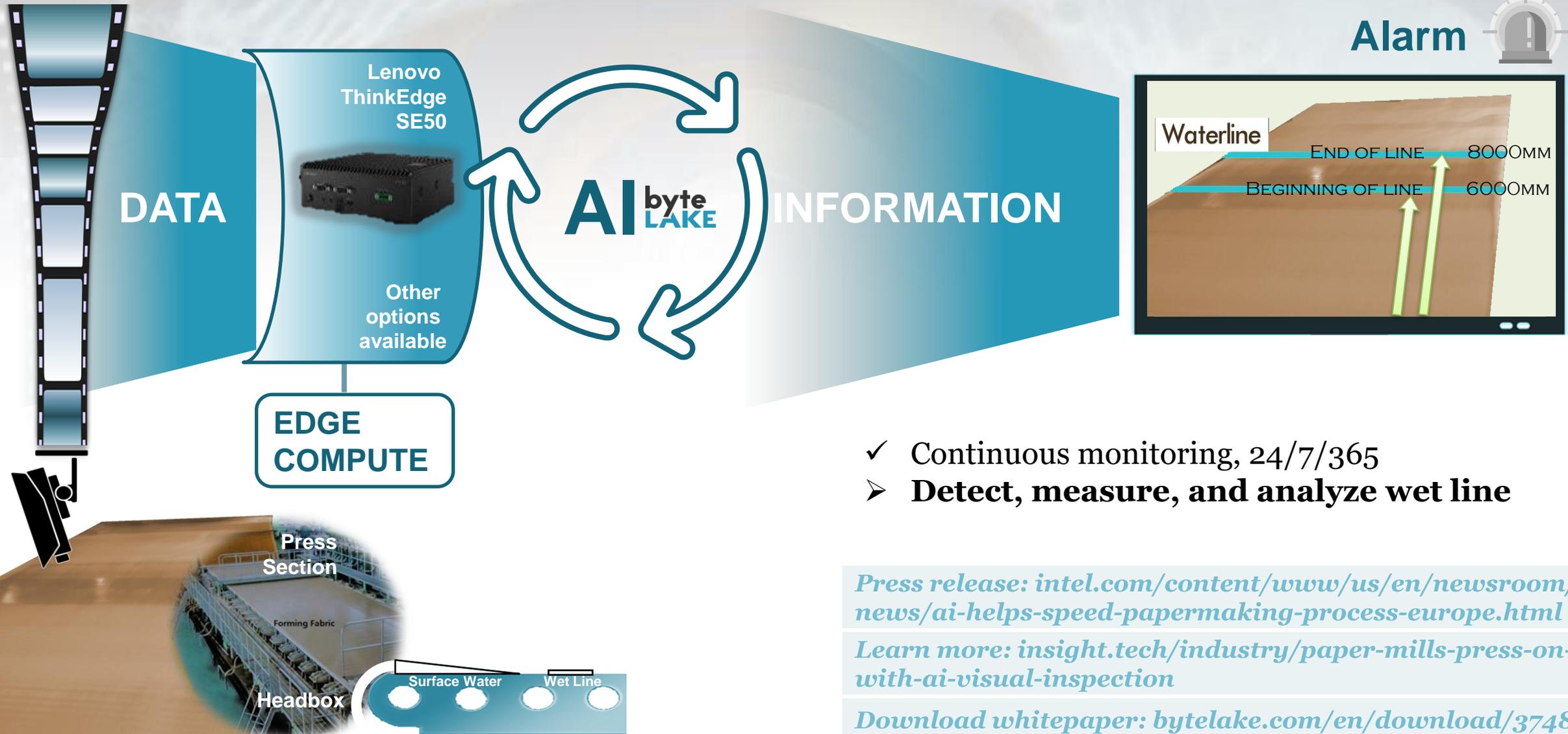


# Visual Inspection - manufacturing

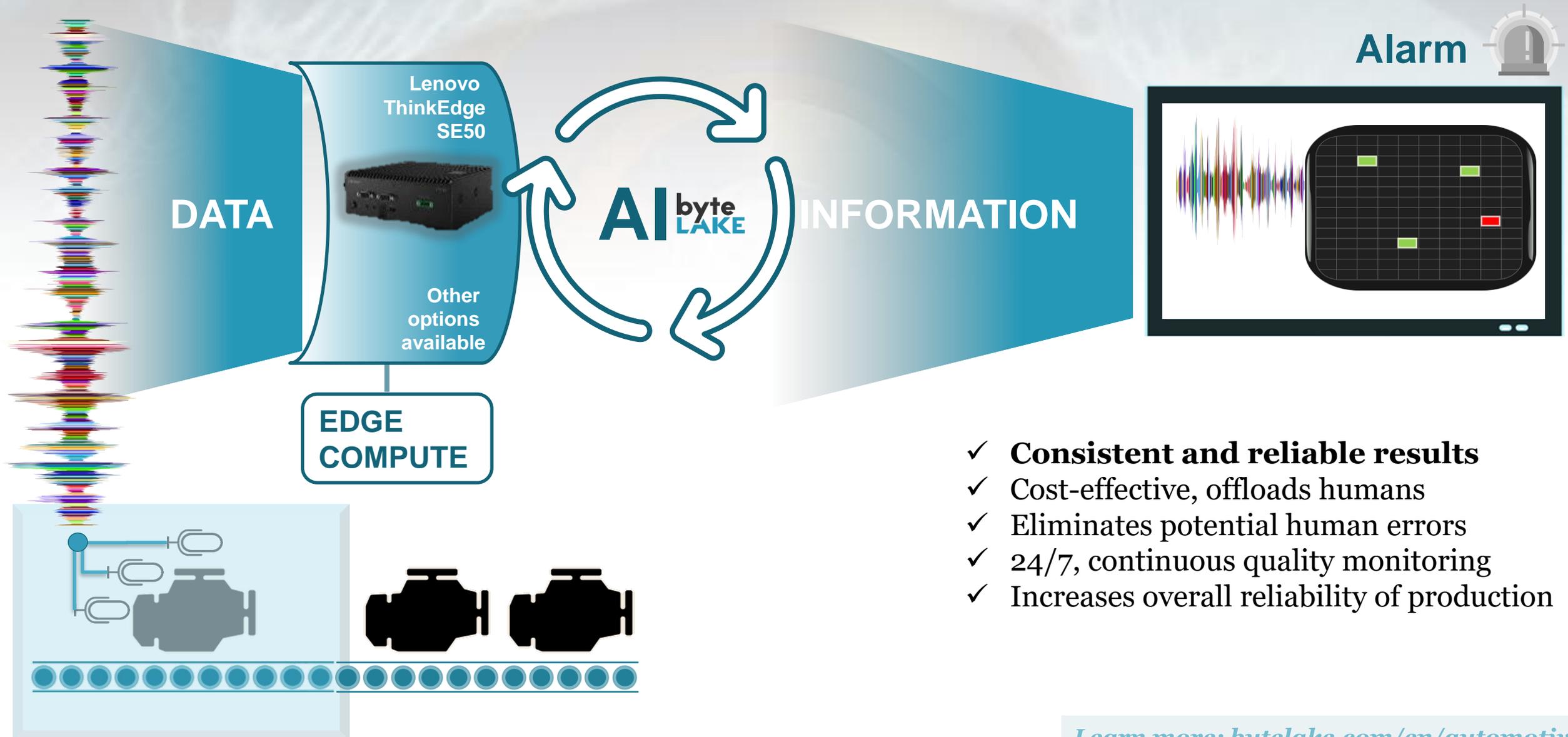


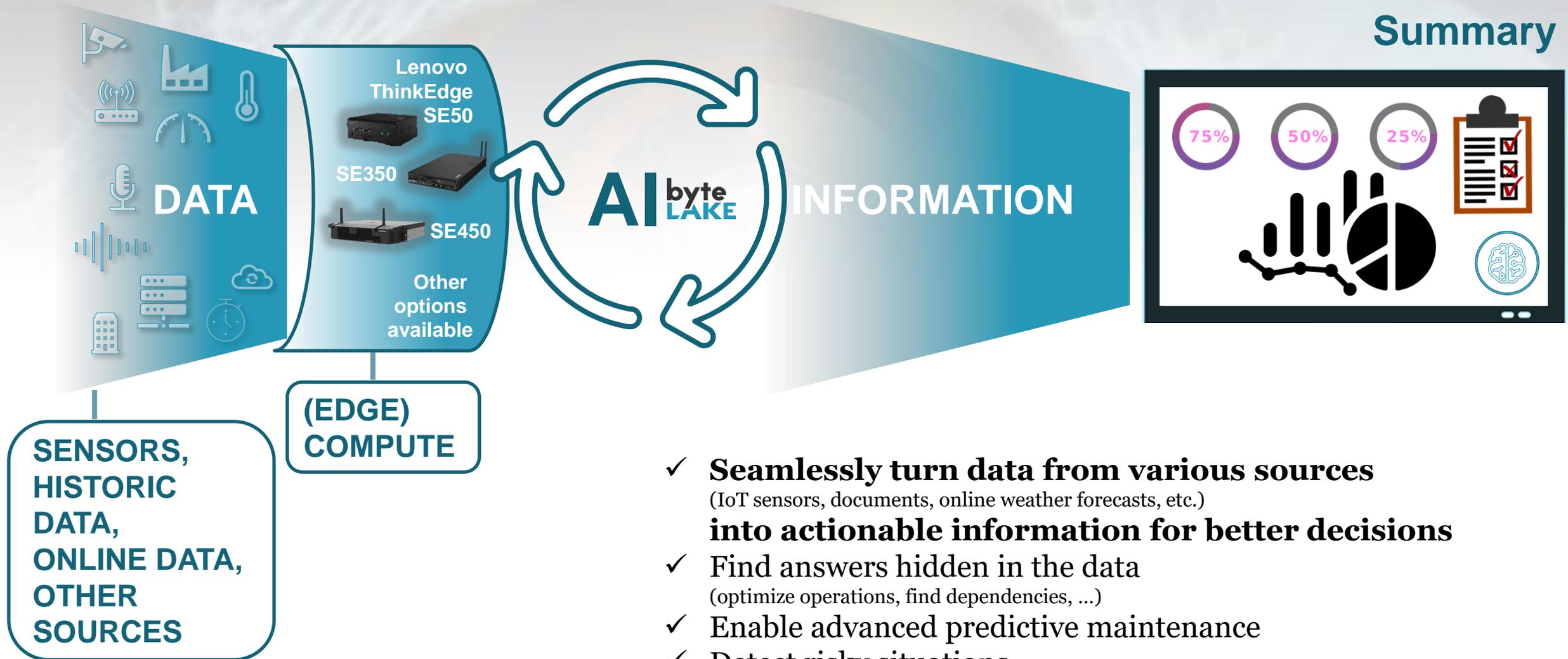
- ✓ Automate quality inspection
- ✓ Small form factor
- ✓ Operating in difficult environments
- ✓ Wireless options
- ✓ Scalable architecture

# Visual Inspection – paper industry



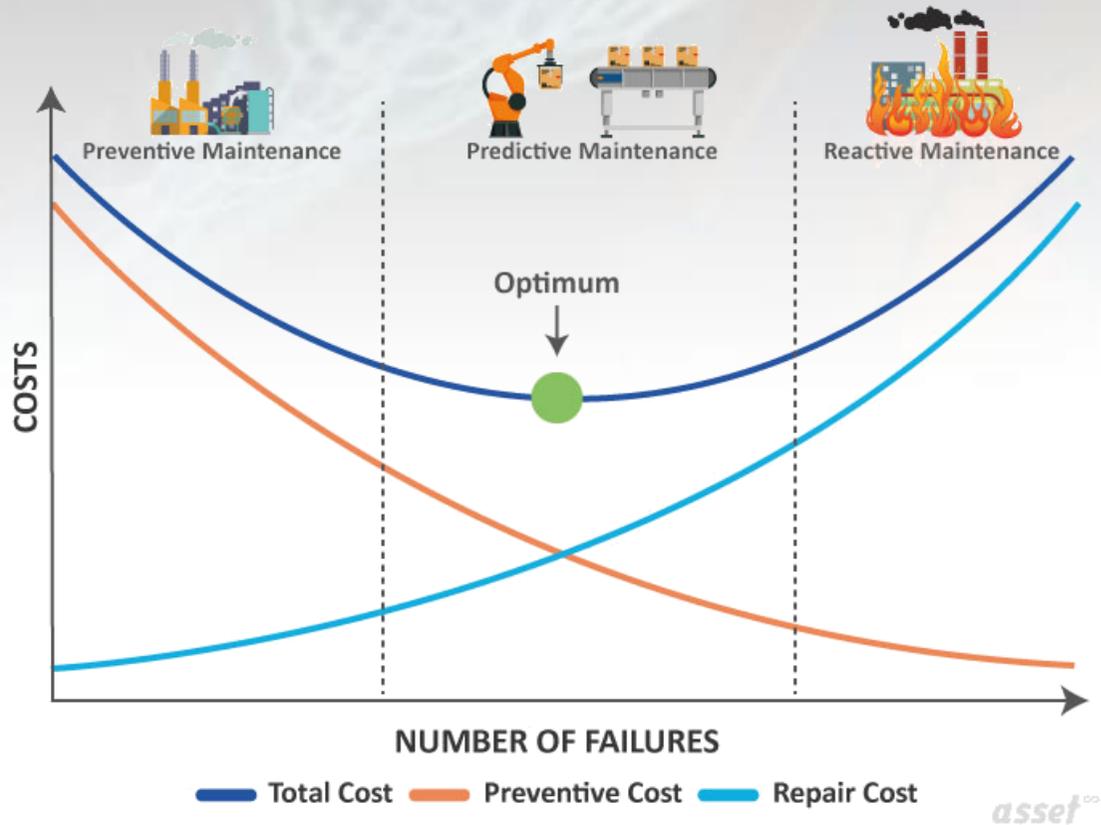
# Sound analytics – automotive





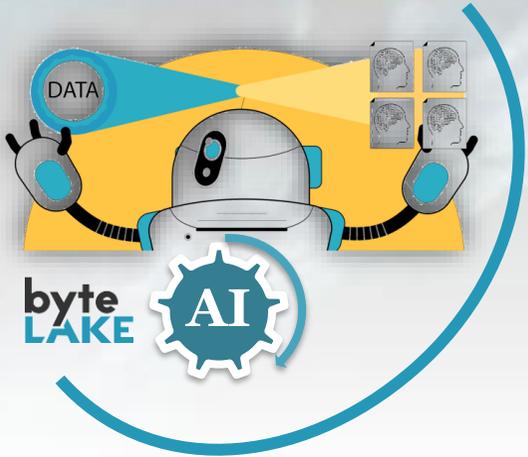
- ✓ **Seamlessly turn data from various sources** (IoT sensors, documents, online weather forecasts, etc.) **into actionable information for better decisions**
- ✓ Find answers hidden in the data (optimize operations, find dependencies, ...)
- ✓ Enable advanced predictive maintenance
- ✓ Detect risky situations

# Optimized Maintenance



	Predictive	Reactive	Preventive
<b>Timing</b>	When required	After breakdown	At predefined intervals
<b>Pros</b>	Lowest risk of breakdown	No fixed costs	Lower risk of breakdown than reactive
<b>Cons</b>	High fixed cost	Higher risk of breakdown	Unnecessary maintenance

# Performance & Scalability



Maximum Performance

## Edge AI



Up to 25x faster

Always optimized for the latest hardware available.

(\*) Performance enhancement achieved through the optimization of byteLAKE's Cognitive Services with Intel® OpenVINO™, Intel® DL Boost Vector Neural Network Instructions (VNNI), and others.

*Performance benchmark (Intel® CPUs & GPUs 2024): (soon)*

*Performance benchmark (Intel® CPUs, 2024): [bytelake.com/en/download/4395/](https://bytelake.com/en/download/4395/)*

*OpenVINO™ benchmark: [bytelake.com/en/download/4067/](https://bytelake.com/en/download/4067/)*

Cost Efficient

## On-premises

Quick deployment & no external dependencies.

Scalable Solution



ThinkEdge SE50



ThinkEdge SE350



ThinkEdge SE450



ThinkSystem SR650V2



ThinkSystem SR670V2

Hardware  
Example configurations. Other options available.

camera feeds

1-5

5-20

10-100

50-150

150+

# AI solving problems



## Visual Inspection

### *Automated visual inspection & objects recognition*

- scratches
- cracks
- dents
- wrong color
- paint chips/peeling
- wrong shape
- fractures
- count objects
- read and analyze labels
- monitor production processes and visually detect anomalies
- etc.

## Sound Analytics

### *Automated quality inspection based on sound analysis*

- enable proactive maintenance
- car engines quality check
- monitor bearings performance
- inspect assembly lines
- analyze sound samples, filter out noise, identify characteristic parts
- detect anomalies
- etc.

## Data Insights

### *Converting DATA into actionable INSIGHTS*

- understand why something happens
- what will likely happen and when?
- find optimal configuration
- explore dependencies
- etc.

Watch on YouTube: [youtu.be/qBtaoIMLedo](https://youtu.be/qBtaoIMLedo)

Download Tech Brief: [bytelake.com/en/download/4400/](https://bytelake.com/en/download/4400/)

# Unlocking Opportunities with AI

## Anomaly Detection, Reduced Downtime, Increased Productivity



**\$200K**

Average cost of unexpected downtime per hour

**~4 Hrs**

Average equipment breakdown time.  
Average loss: \$1,040,000.

**~80%**

Companies affected by unexpected downtime in the past 3-4 years.

**25% ↓**

Lower maintenance costs

**70% ↓**

Less breakdowns

**35% ↓**

Less downtime



Too Early / Too Late Maintenance

**>75%**

Zero unexpected downtime as a top priority for most organizations.

**+20%** improving over time

Increased productivity



Unexpected Downtime

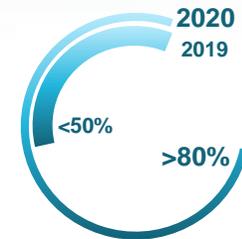
The average cost of an unplanned downtime is USD \$220,000 a day for a paper or pulp plant.

International Journal of Strategic Engineering Asset Management

# Benefits

## offered by byteLAKE's Cognitive Services

- **Accelerate Data Analytics**
  - Processing data from various sources, including images, videos, and sensors.
- **Automate Quality Inspection**
  - Ensuring high accuracy in inspecting products and processes.
  - Eliminating potential human errors for consistent and reliable results.
  - Increasing overall quality and reliability.
- **Optimize Operations and Maintenance**
  - Reducing unnecessary inspections and lowering maintenance costs.
  - Predicting potential failures and downtimes.
- **Continuous Monitoring**
  - Offering 24/7/365 monitoring without boredom or distraction.
  - Offloading and supporting human operators.
- **Easy Replication**
  - Enabling quick deployment.
  - Functioning offline without an internet connection.
- **Continuous Improvement**
  - The solution can learn and improve over time.



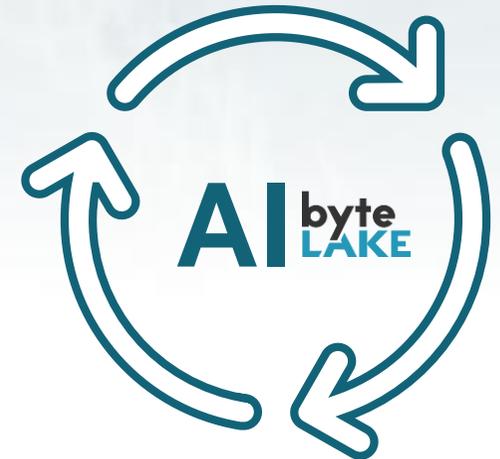
**Growing AI  
adoption**

**~80%**  
Human quality control's  
average accuracy

**99%**  
Accuracy with AI

# AI in Manufacturing - benefits

- **Enhanced Productivity**
  - Streamlining processes for increased productivity.
  - Efficient resource allocation based on real-time data.
- **Customization and Adaptability**
  - Tailoring AI models to specific manufacturing requirements.
  - Adapting to changing production needs seamlessly.
- **Reduced Downtime**
  - Minimizing production downtime through predictive maintenance.
  - Optimizing machine uptime and reliability.
- **Data-Driven Decision-Making**
  - Empowering decision-makers with actionable insights.
  - Enabling data-driven strategies for process improvement.
- **Consistent Quality Control Across the Organization**
  - Ensuring consistent product quality throughout the production process.
  - Meeting industry standards and regulations effortlessly.



# Evolution of Industry: 4.0 and beyond

2020 - ????

## Industry 5.0

Human-centric  
and resilient  
European  
industry.  
Reinforces the role  
and the  
contribution of  
industry to society



2011 - Today

## Industry 4.0

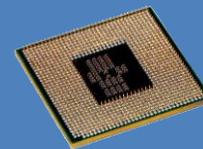
Cyber Physical  
Systems  
Internet of things,  
Networking,  
Big Data,  
Artificial  
Intelligence



1960-2010

## Industry 3.0

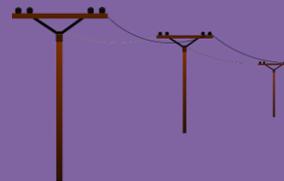
Computers and  
electronics  
Automation



1830s-1915

## Industry 2.0

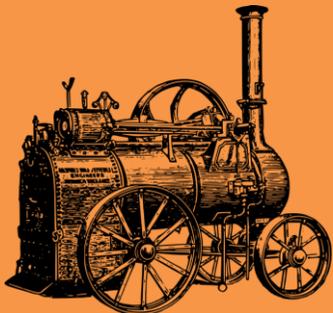
Electricity  
Mass production  
Assembly line



1760-1840

## Industry 1.0

Mechanization  
Steam power  
Weaving loom



# Case Study – AI for Industry 4.0

A Business Value Case Study, sponsored by Intel



INTEL OPTIMIZED CASE STUDY SERIES

## How byteLAKE Creates AI-Driven Industrial Solutions Using Intel Xeon Scalable Processors

- ✓ **High Performance and Accuracy**
- ✓ **Edge AI Optimized Solution**
- ✓ **Continuous Monitoring**
- ✓ **Industry 4.0 Automation**

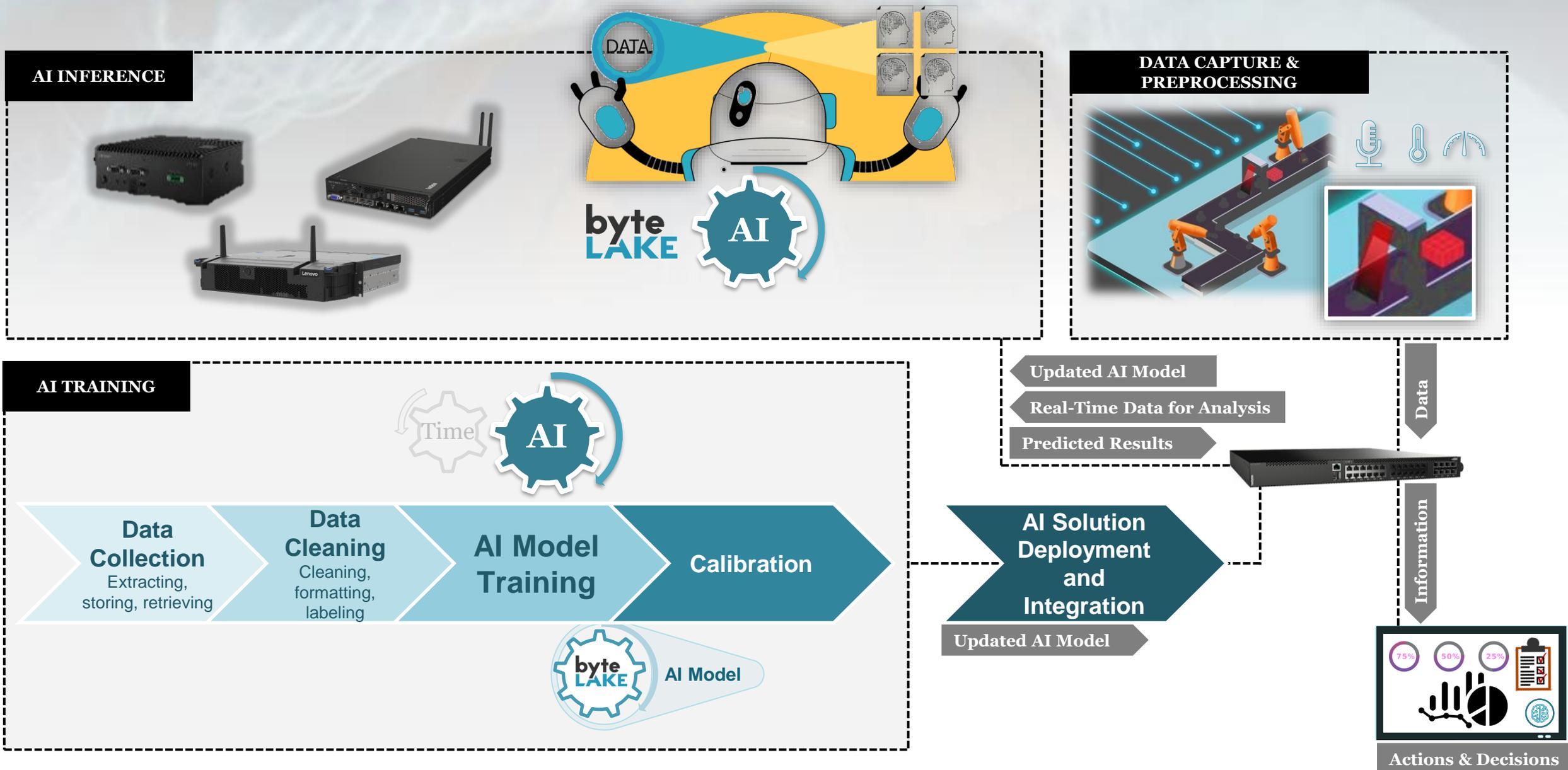


## Automated Quality Inspection

# Deployment & Licensing

byteLAKE's Cognitive Services

# Cognitive Services Deployment Architecture

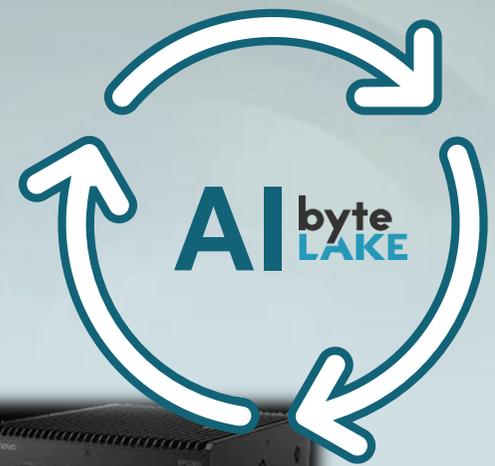


# Cognitive Services

## AI Quality Inspection System / Data Insights



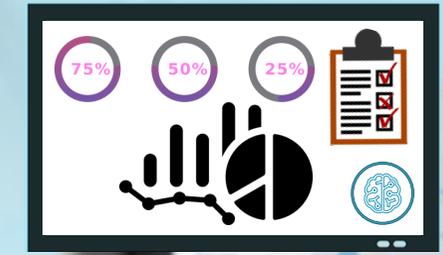
### EDGE AI



Data

Information

### FRONT-END



- Production Line
- Assembly Line
- Infrastructure

- Quality Analytics
- Data Analytics

- Dashboard
- Actions & Decisions

# Edge AI

Data processed close to where it is produced, on-premises

## AI on Edge: limitless possibilities

Bringing  
Artificial  
Intelligence  
to the Edge

Near-  
real-time  
AI experience

Reduced  
bandwidth  
needs

Scalability  
for IoT



- **Real-time Decision-Making**

- Immediate AI analysis at the edge enables rapid decision-making without relying on external services, critical for industrial applications.

- **Energy Efficiency**

- Edge AI can optimize energy consumption by processing data locally and reducing the need for constant data transmission.

- **Offline Operation**

- Edge AI allows devices to continue functioning and making decisions even when there is no internet connectivity.

- **Redundancy and Reliability**

- Distributed edge AI systems can offer redundancy and fault tolerance, ensuring continued operation in case of device or network failures.

- **Enhanced Privacy and Security**

- AI processing on the edge device reduces the need to transmit sensitive data to external servers, enhancing data privacy and security.

- **Low Bandwidth Requirements**

- Edge AI minimizes the need for continuous high-bandwidth data transfer, reducing network congestion and associated costs.

- **Customization and Adaptation**

- Edge AI models can be tailored to specific device requirements and updated easily to adapt to changing conditions.

### 1. Define the Scenario

- Determine the purpose of AI analytics, such as detecting surface anomalies, monitoring assembly lines, automating operations, accelerating processes (e.g., production, purchasing), automating repetitive and dangerous tasks, improving analytics for better decision-making, and enabling predictive maintenance. Are there any other specific objectives?

### 2. Explain Expectations

- Discuss the placement and quantity of cameras or sensors to be used if known.
- Describe existing and potential data sources, including future ones if known.
- Specify the desired level of accuracy.
- Provide information about production rates and expected system performance, considering future growth.
- Define uptime requirements and any other specific system requirements.



# How to Start - first steps in the project

## Cognitive Services

### 1. Scenario Explanation

- Provide example pictures, videos, or other relevant data.
- Conduct online consultations or arrange in-person meetings as needed.

### 2. Initial Data Insights

- Explain your data, including types, ranges, and dependencies.
- Identify unusual scenarios or exceptions.
- Determine if historic data is available and note any gaps.
- Discuss data storage methods and assess the need for changes or improvements.
- Share sample data with us.

### 3. Online Q&A Session

- Conduct an online Q&A session to address questions about the presented data and scenario.

### 4. Deployment Plan and Schedule

- Present a detailed deployment plan and schedule prepared by byteLAKE.



# Licensing & Cost of Deployment

## Cognitive Services

- **Licensing**

- Annual/monthly licensing plans for Cognitive Services, including upgrades, customer care, and support.

- **AI Model Development**

- Costs for AI model training and calibration.

- **Data Management**

- Expenses related to data collection and cleaning.

- **Hardware and Software**

- Hardware costs, including PCs and sensors, as well as any associated licenses.
- Installation expenses.

- **Integration and Deployment**

- Integration efforts as required for successful deployment.



# Learn more

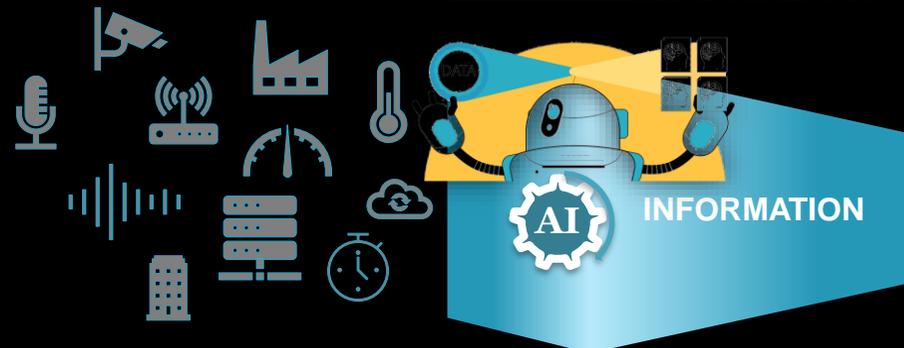
byteLAKE's Cognitive Services

## Blog post series

[byteLAKE.com/en/CognitiveServices-toc](https://byteLAKE.com/en/CognitiveServices-toc)

### Table of Contents

1. [Machine Vision, how AI brings value to industries](#)
2. [Cognitive Automation helps where RPAs fall short](#)
3. [AI for Manufacturing: Edge AI, Federated Learning, Computer Vision \(webinar\)](#)
  - [Related presentation on SlideShare](#)
  - [Direct link to a video](#)
4. [Revolution in factories: Industry 4.0. \(conference: Made in Wroclaw 2020\) \(translation\)](#)
  - [Video recording \(in Polish, English subtitles\)](#)
  - [Presentation in English, in Polish](#)
5. [AI-accelerated Computational Fluid Dynamics \(CFD\) simulations \(blog post series\)](#)
6. [Backoffice tasks automation: AI for document processing](#)



### Website:

[byteLAKE.com/en/CognitiveServices](https://byteLAKE.com/en/CognitiveServices)

### Contact us

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# Meet byteLAKE

AI Solutions for Industries |  
Quality Inspection |  
Data Insights |  
Predictive Maintenance |  
AI-accelerated CFD |  
Self-Checkout

Empowering Industries with Artificial Intelligence Solutions.

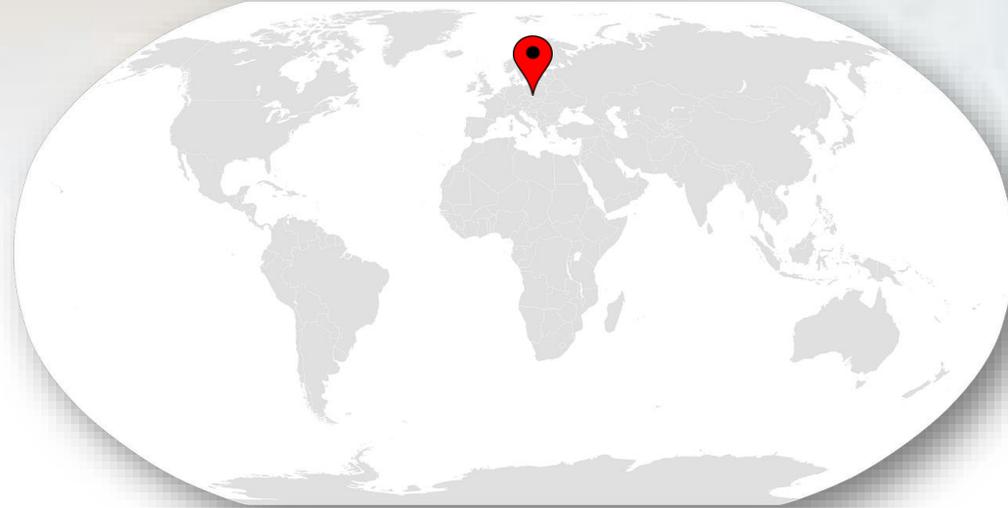
At byteLAKE, we harness cutting-edge technology to provide advanced quality inspection and data insights tailored for the Manufacturing, Automotive, Paper, Chemical, and Energy sectors.

Additionally, we offer self-checkout stations for Restaurants and object recognition solutions for Retail businesses.

[www.byteLAKE.com](http://www.byteLAKE.com)

byte  
LAKE

## Headquartered in Poland

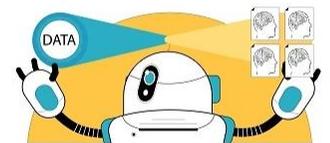


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## Products:



CFD Suite



Cognitive Services

# byteLAKE's AI Products

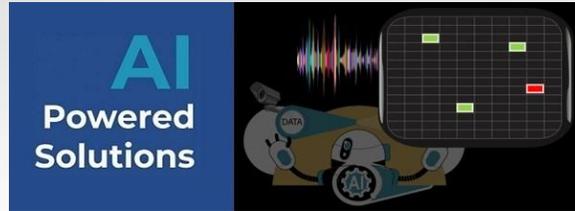


## Cognitive Services

Advanced quality inspection and data insights.



for Manufacturing

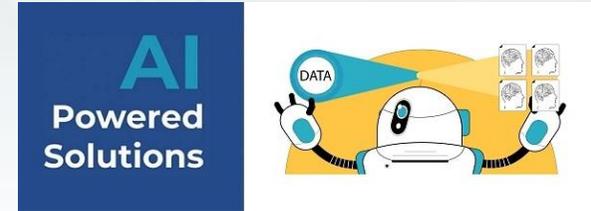


for Automotive



for Paper Industry

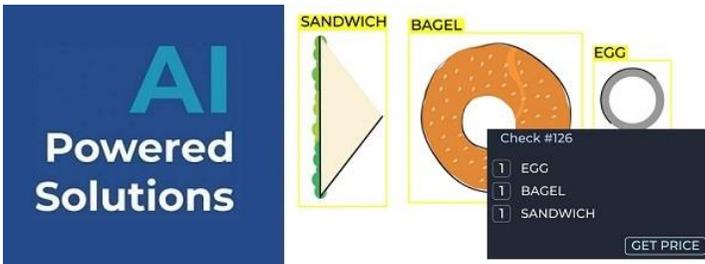
## Predictive Maintenance



Data Insights

## Cognitive Services for Restaurants

Self-checkout and object recognition.



**CFD Suite**

AI-accelerated Computational Fluid Dynamics.