

# A use-case focus: driving a data driven business



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# Hitachi Enables Digital Transformation That Creates Value



Hitachi  
IoT  
Innovation  
is in our  
DNA



# Hitachi IoT Expertise

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## HEALTHCARE



PARTICLE BEAM THERAPY



TESTING AND DIAGNOSTIC



CONNECTED HEALTH



BIOINFORMATICS



MEDICAL IMAGING AND DISTRIBUTION



PHARMACEUTICAL SOLUTIONS

## DATA-DRIVEN BUSINESS



MACHINE ANALYTICS



HUMAN ANALYTICS



BUSINESS ANALYTICS



DEVICE CONNECTIVITY



PREDICTIVE ANALYTICS



ENTERPRISE INTEGRATION

## ENERGY



ENERGY SUPPLY MANAGEMENT



WIND TURBINES



RENEWABLE ENERGY



ENERGY DEMAND MANAGEMENT



BATTERY SYSTEMS



MICROGRIDS & GRID STABILITY

## TRANSPORTATION



AIRPORT SOLUTIONS



RAIL SYSTEMS



TRAFFIC MANAGEMENT



FLEET & LOGISTICS MANAGEMENT



AUTOMOTIVE SYSTEMS



SMART ACCESS CLOUD SYSTEMS

## SMART CITY



PUBLIC SAFETY



CITY DATA EXCHANGE



TELCO ANALYTICS



MANUFACTURING OPTIMIZATION



SUPPORT CHAIN



CONSTRUCTION MACHINERY



WATER & SEWAGE SYSTEMS



TECHNOLOGY INFRASTRUCTURE



BUILDING SYSTEMS



COMPUTER INTEGRATED MANUFACTURING



PRODUCTION CONTROLS



CONSTRUCTION MANAGEMENT

# Hitachi Vantara

## FOCUS

Driving results for customers from edge to outcomes

## CUSTOMERS

10,000+

Trusted by 81% of the Fortune Global 100

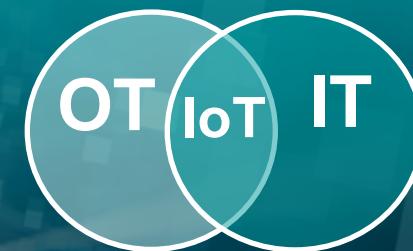
## SOLUTIONS

60% software and services  
X as a Service

## ECOSYSTEM

>2,000 partners

## DIFFERENTIATION

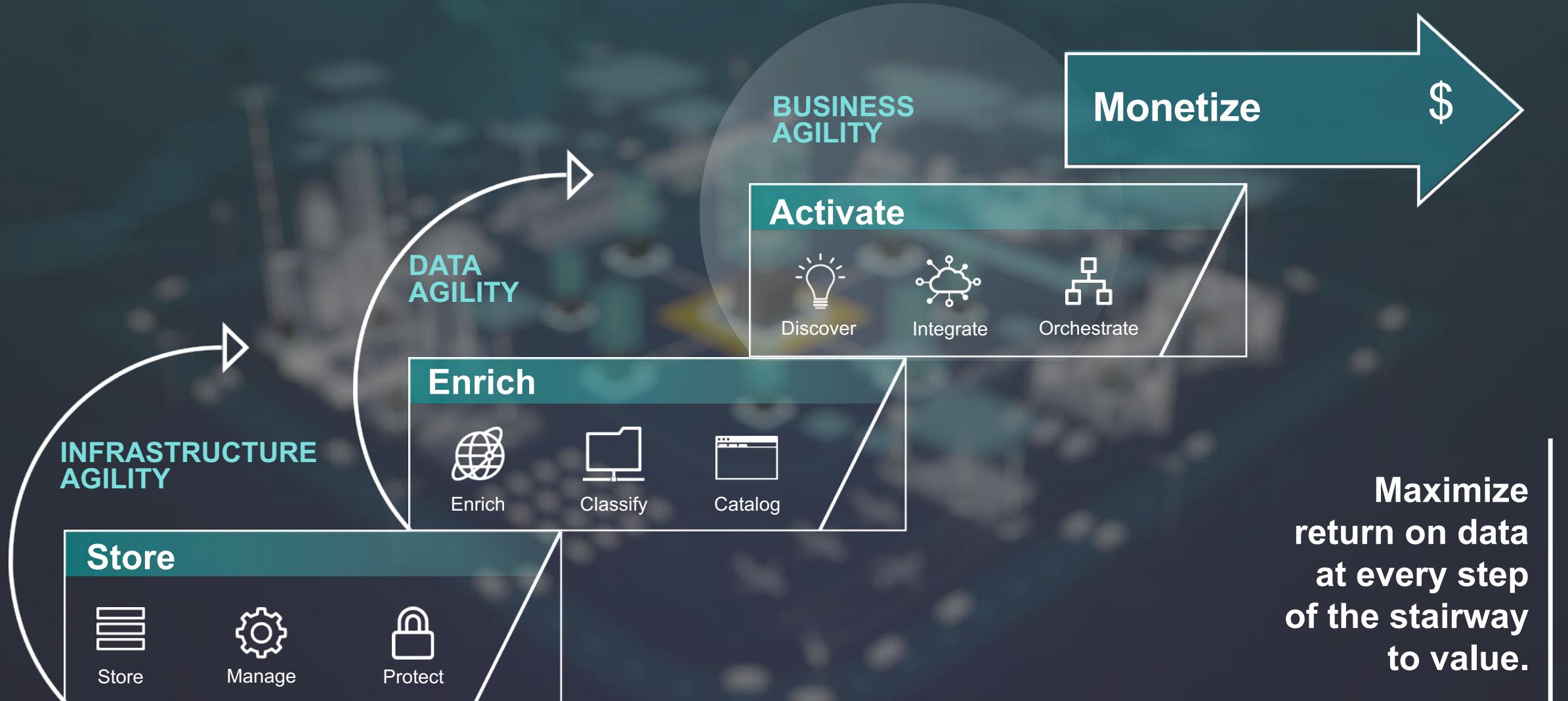


## AWARD WINNING CULTURE



# Gain Return on Your Data With Our Data Stairway to Value

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# Hitachi is Going Through Its Own Digital Transformation

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As the global market changes and new technology and business trends emerge, Hitachi continues to innovate and evolve our role as a Digital and IoT Partner.

**2016**



## Lumada IoT Platform

Build the foundation for digital with an open, scalable best-in-class IoT platform

**2017**

## Digital Solutions

Development of Digital Industry Solutions to unlock the value of data and insights

**2018**

## Service Creation

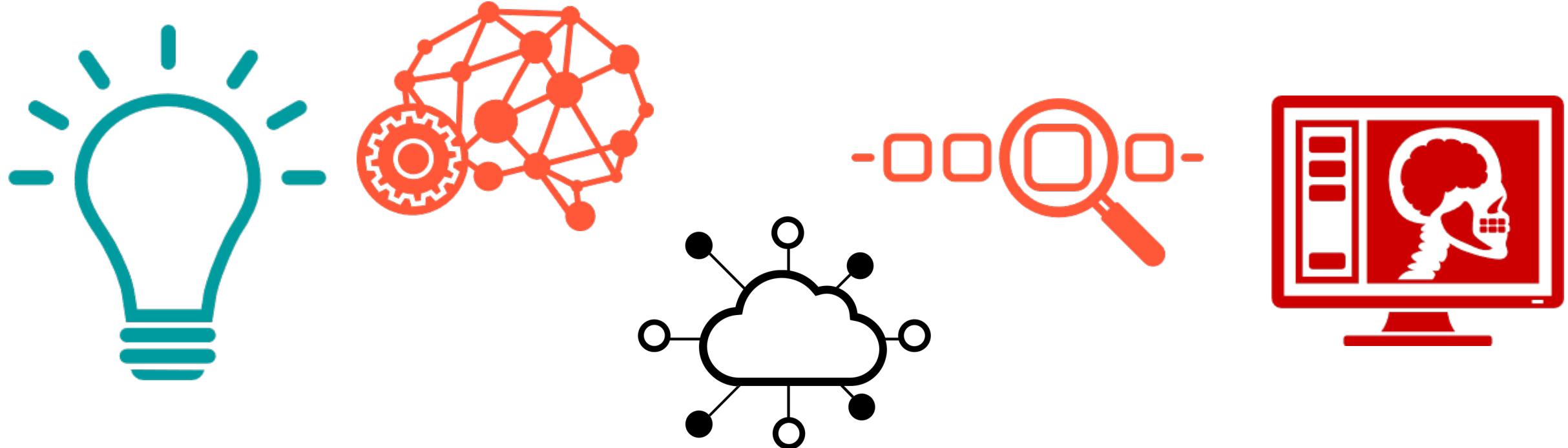
Creation of new business models as the market shifts from products to services

**NEXT**

## Digital Ecosystems

Establishing integrated digital ecosystems of partners and customers to unlock new business value

# Automation of Microscope Operation



Co-Creation

Cognitive Technology

Microscopy as a service

AI & ML

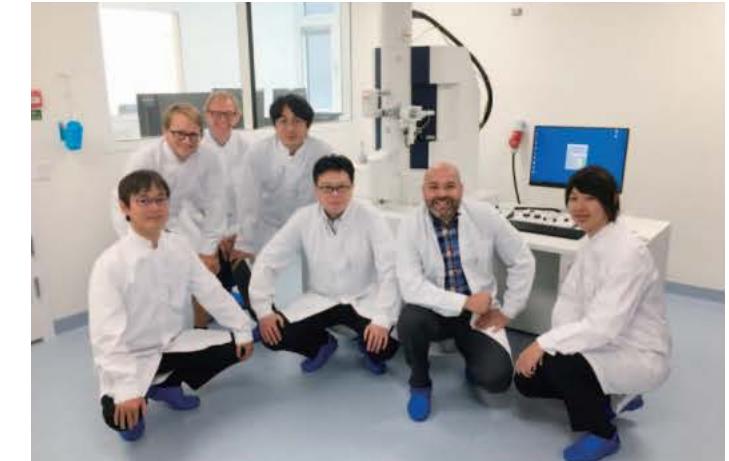
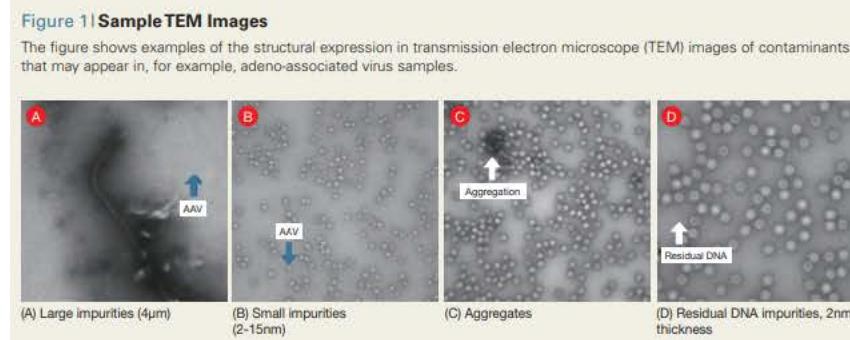
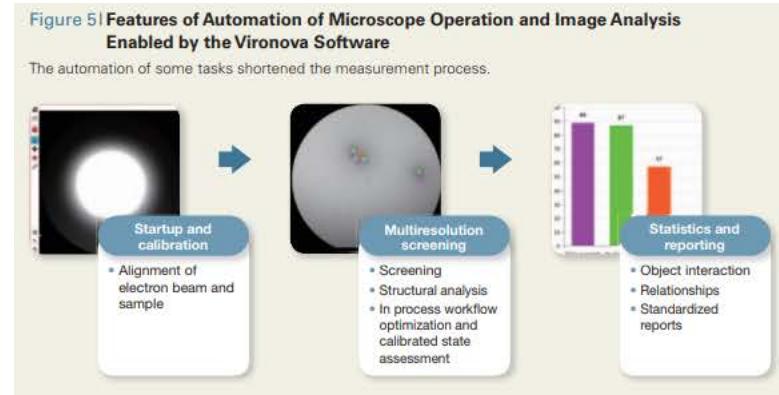
Vironova in Sweden

Hitachi High-technology

Hitachi Vantara

# Automation of Microscope Operation and Image Analysis Enabled by the Vironova Software

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Martin mentions:

*"The Hitachi scale-out node architecture has reduced the run time **from 5 days to 1 hour** compared to the hardware used in the lab for possible next generation algorithms. We expect further reduction by rewriting the algorithm to fully utilize the scale-out high-performance node architecture"*

# Driving the digital frontiers in shipping



## Driving the digital frontiers in shipping

*Supporting Stena Line on their journey to becoming the leading cognitive shipping company in the world*



# Fuel usage is a major cost saving opportunity

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In many cases  
bunker cost  
accounts for 30%  
of revenue in a  
shipping company

Fuel prices are  
steadily rising, as  
are tariffs on high  
emissions



Customers are  
increasingly  
conscious of  
reducing  
environmental  
impact

Optimising bunker usage can save you money,  
improve your operations, and grow your  
customer base

# AI enabled support to allow a captain take decisions based on facts to optimize fuel consumption

Destination

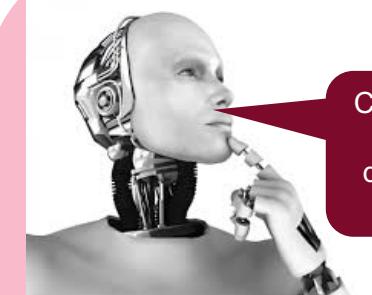
## AI assistant to improve Fuel Consumption



### The background..

Route planning optimization is dependent on varying a ship's speed in different parts of a route. Since the external conditions (wind, current and depth) vary, fuel consumption cannot be maintained at a minimum, if a constant speed and direction is kept throughout the route.

Therefore we have to find the speed distribution and optimal direction that minimizes the total fuel consumption within the constraint of keeping the scheduled arrival time.



Captain, reduce speed by 1 knot and change direction with 1 degree east. That will save you yy kg fuel.



OK, assistant. We saved xx% on the last journey we made so I trust you.

Start

### The vision..

A captain assisted by a trained AI to make the best possible decisions in order to improve fuel efficiency.

Scaling of the best knowledge and make it available to all captains through a highly trained AI assistant

# High level Machine Learning approach for PoC. Feature selection and parameter learning

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Data extraction

Feature selection

Relevant features

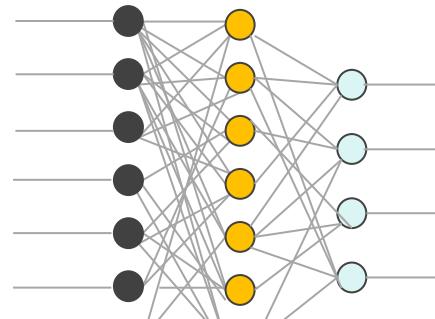
Learn the relationship

Validate

Input (history)

- water depth
- weather changes
- number of engaged engines
- water current, direction and speed
- winds and waves, direction and speed
- speed relative to ground
- speed through water
- Aerodynamical hull design
- Hull cleaning interval
- trim of the vessel
- pitch angle
- load balancing
- propeller RPM, torque
- bearing or routes
- fuel consumption of past trips
- Propulsion power
- ...
- ...

Neural network or any other ML algorithm

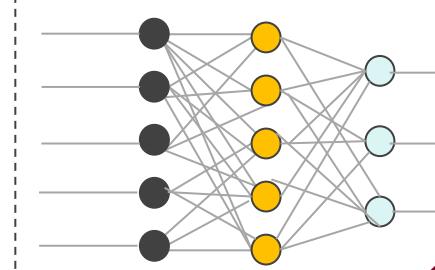


Output

- weather changes
- water current, direction and speed
- winds and waves, direction and speed
- speed relative to ground
- speed through water
- Hull cleaning interval
- trim of the vessel
- fuel consumption of past trips
- bearing or routes
- Propulsion power
- ...
- ...

Input

Neural network or any other ML algorithm



Learnt functions

- $f_{fuel\_cost}(speed, trim, current, wind..)$
- $v_{speed}(trim, current, wind, bearing, ...)$
- $r_{trim}(speed, current, wind, bearing ...)$
- $x_{route}(speed, trim, current, wind, ...)$
- ...

Output

- speed
- bearing or routes
- Trim
- estimated fuel consumption
- ...

$$\begin{aligned} & \min_{v, r, \bar{w}} && \sum_{i,j \in \mathcal{A}} x_{ij} f(v, r, \bar{c}, \bar{w}) \\ \text{s.t.} & && \sum_{i,j \in \mathcal{A}_t} x_{ij} \frac{d_{ij}}{v_{ij}} \in [t_t^0, t_t^1], \forall t \in L \\ & && \{(i, j)\}_{x_{ij}=1} \text{ forms a path from origin to destination} \\ & && v_{ij} \in [v_{ij}^{\min}, v_{ij}^{\max}], \forall (i, j) \in \mathcal{A} \\ & && r_{ij} \in [r_{ij}^{\min}, r_{ij}^{\max}], \forall (i, j) \in \mathcal{A} \\ & && x_{ij} \in \{0, 1\}, \forall (i, j) \in \mathcal{A} \end{aligned}$$

# High-Speed Trains and IoT – Operating Model

# Copenhagen Smart Driverless Metro

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- Driverless trains operated by Hitachi (Ansaldo STS)
- Real-time demand at stations
- Automated deployment based on demand
- To leverage predictive analytics to proactively plan for future demand

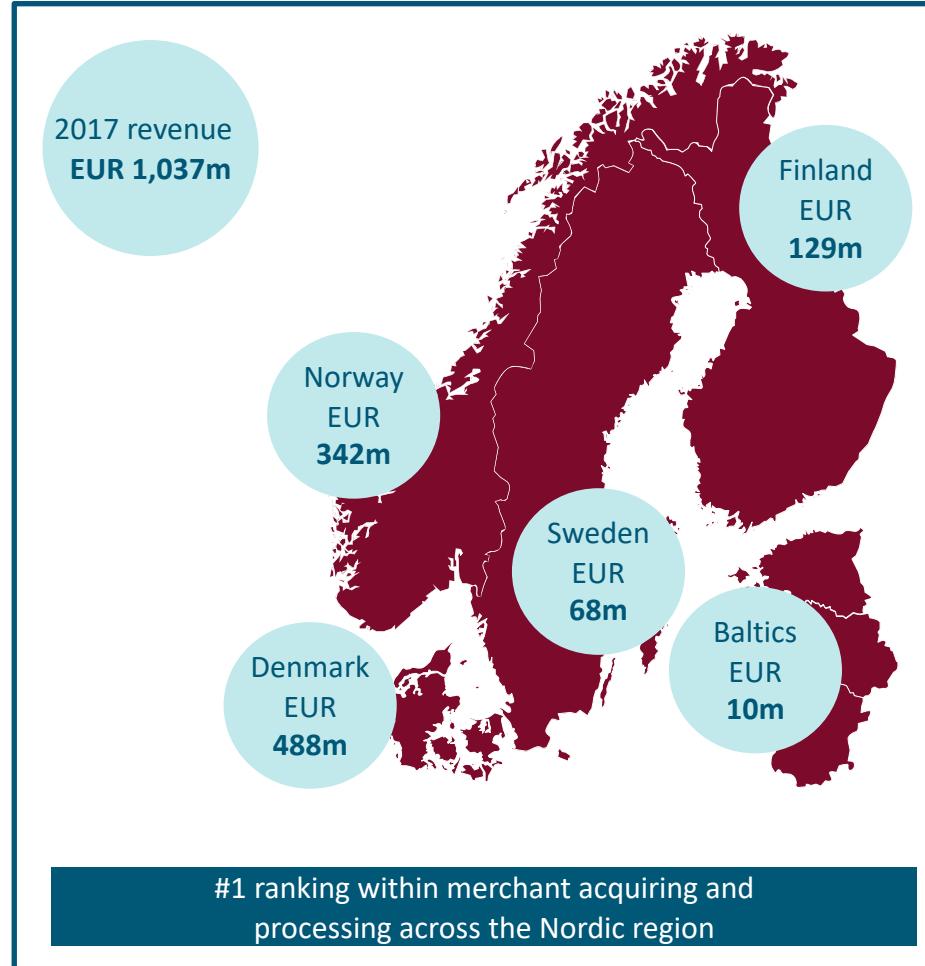
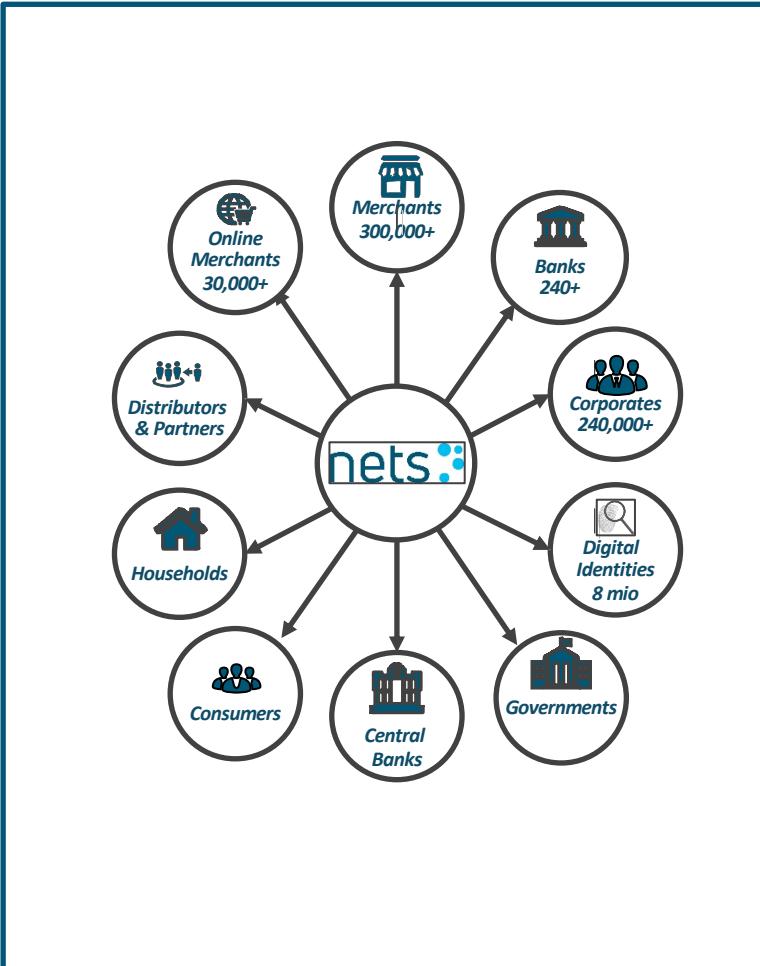


# Manufacturing Use case in Sweden

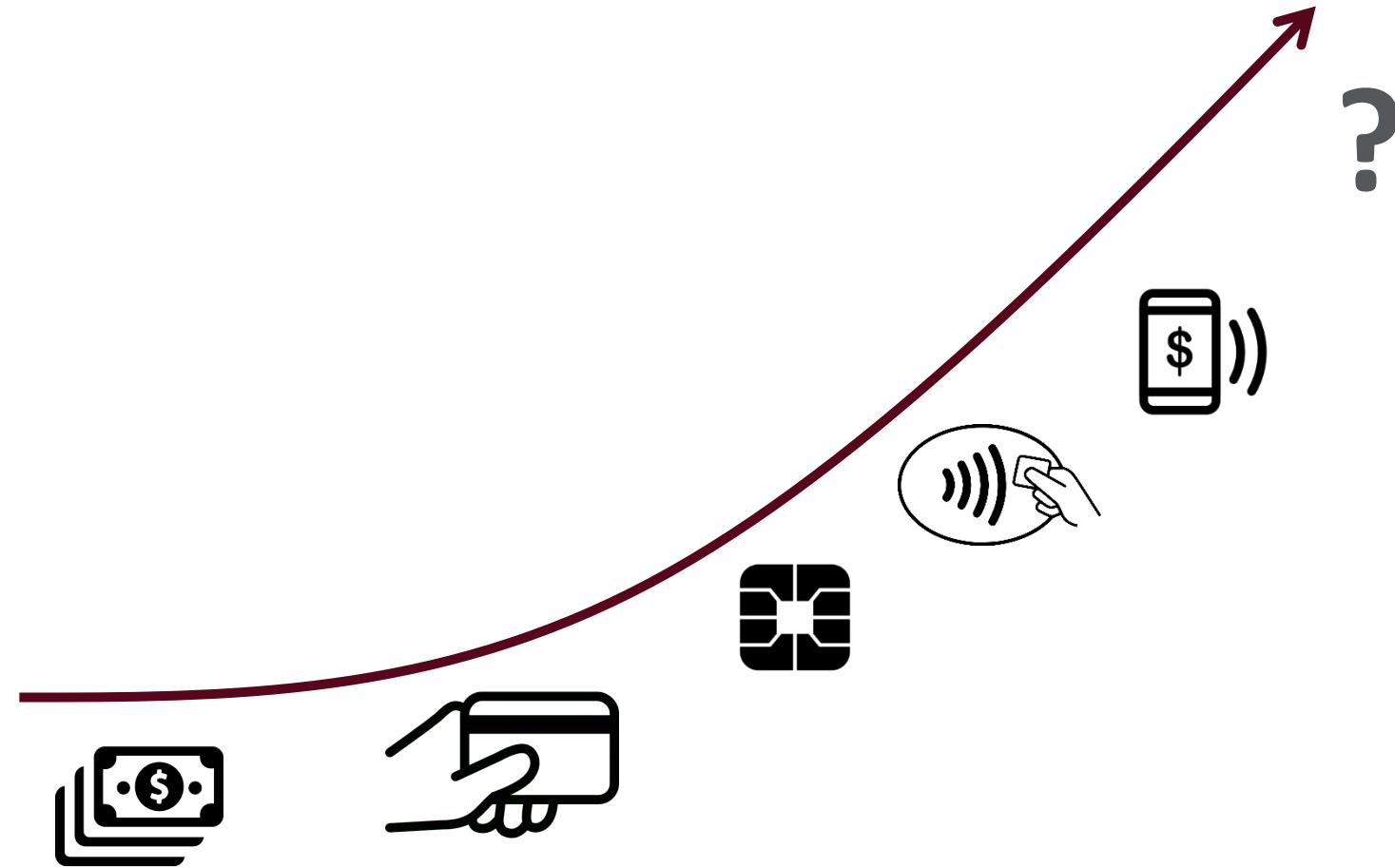
# Case Studies – Cashless Payments



# Nets is at the heart of the payments ecosystem and a leader across the Nordic region



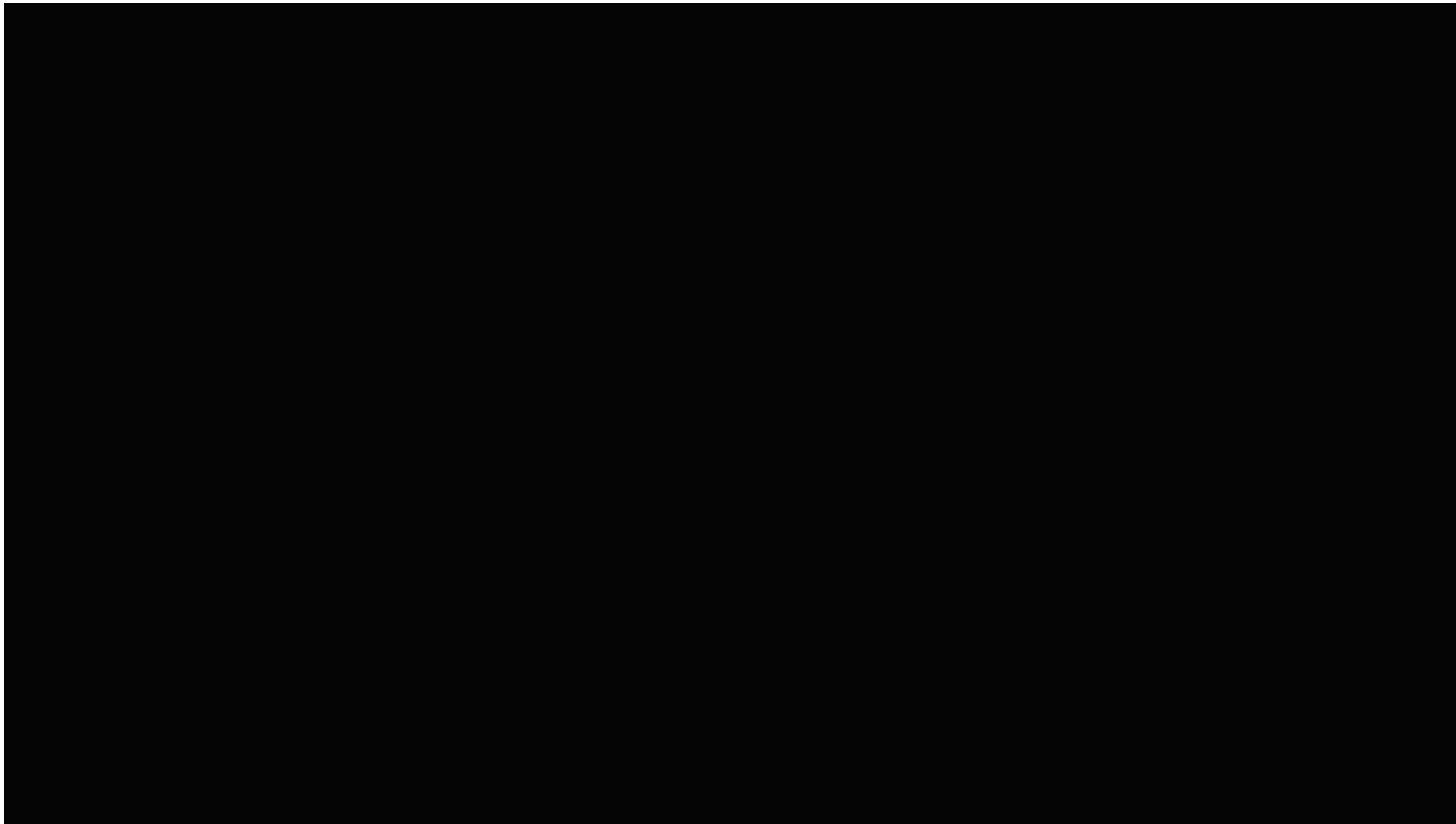
# What is next



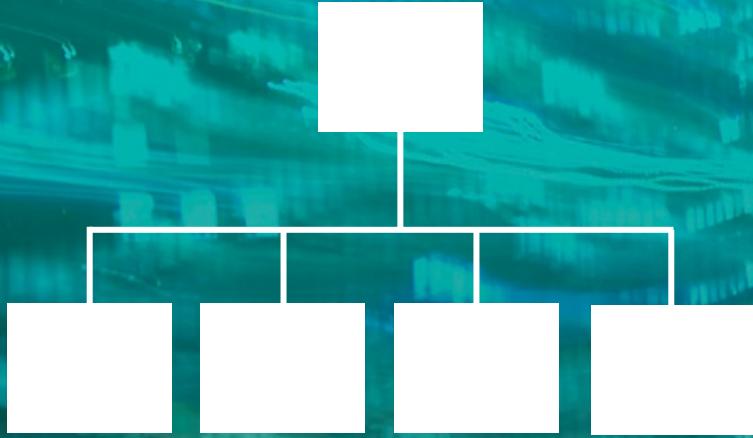
Can customer experience and payment security be improved by eliminating the need for cash, mobile phones and payment cards when buying in a merchant?



# Nets Company Overview



# The Future of Data Analytics

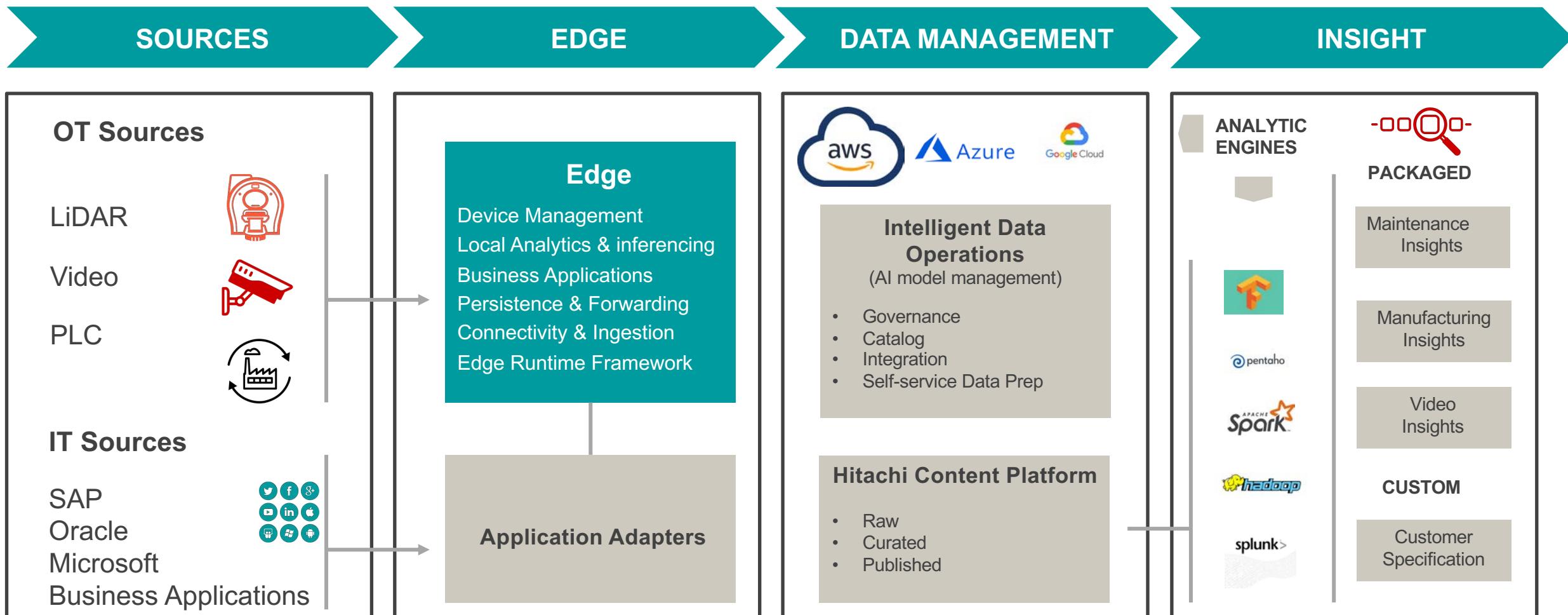


Centralized



Distributed

# DataOps – from edge to outcome



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