



# Machine Learning selber einsetzen – Einfacher Einstieg mit Microsoft Azure

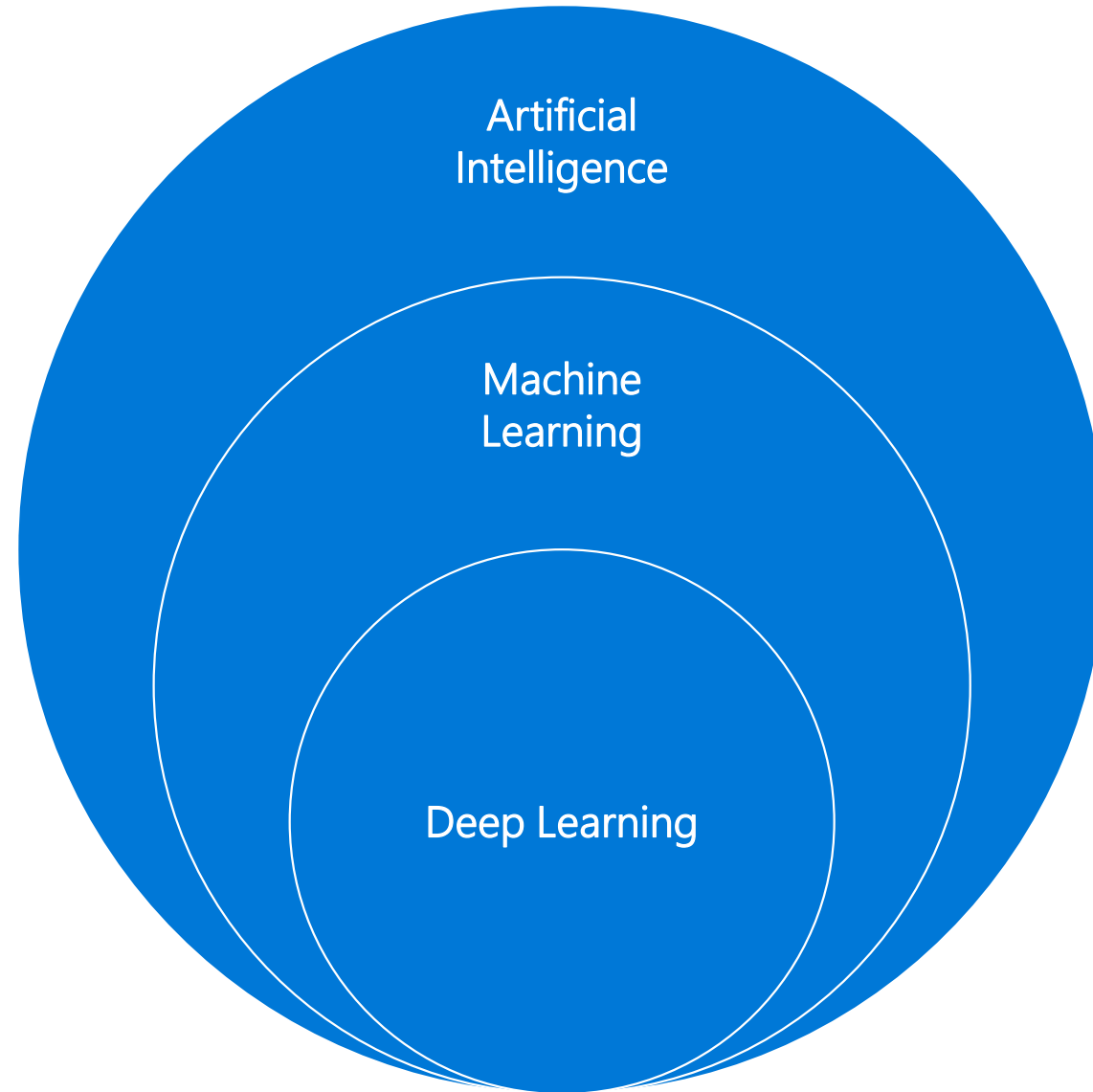
BVL Digital Webinar, 14.05.2019

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Lars Terlecki, Consultant Data Analytics, KI Group

# Microsoft AI



AI > ML > DL



# ARTIFICIAL INTELLIGENCE

## NARROW AIS

Image Recognition

Voice Recognition

System Modelling

...

Jeopardy AI

Chess AI

Go AI

## METHODS

Rule Based

or

Machine Learning

THAT'S THE JUICY STUFF :)

## ALGORITHMS

if X then Y

Linear Regression

Decision Trees

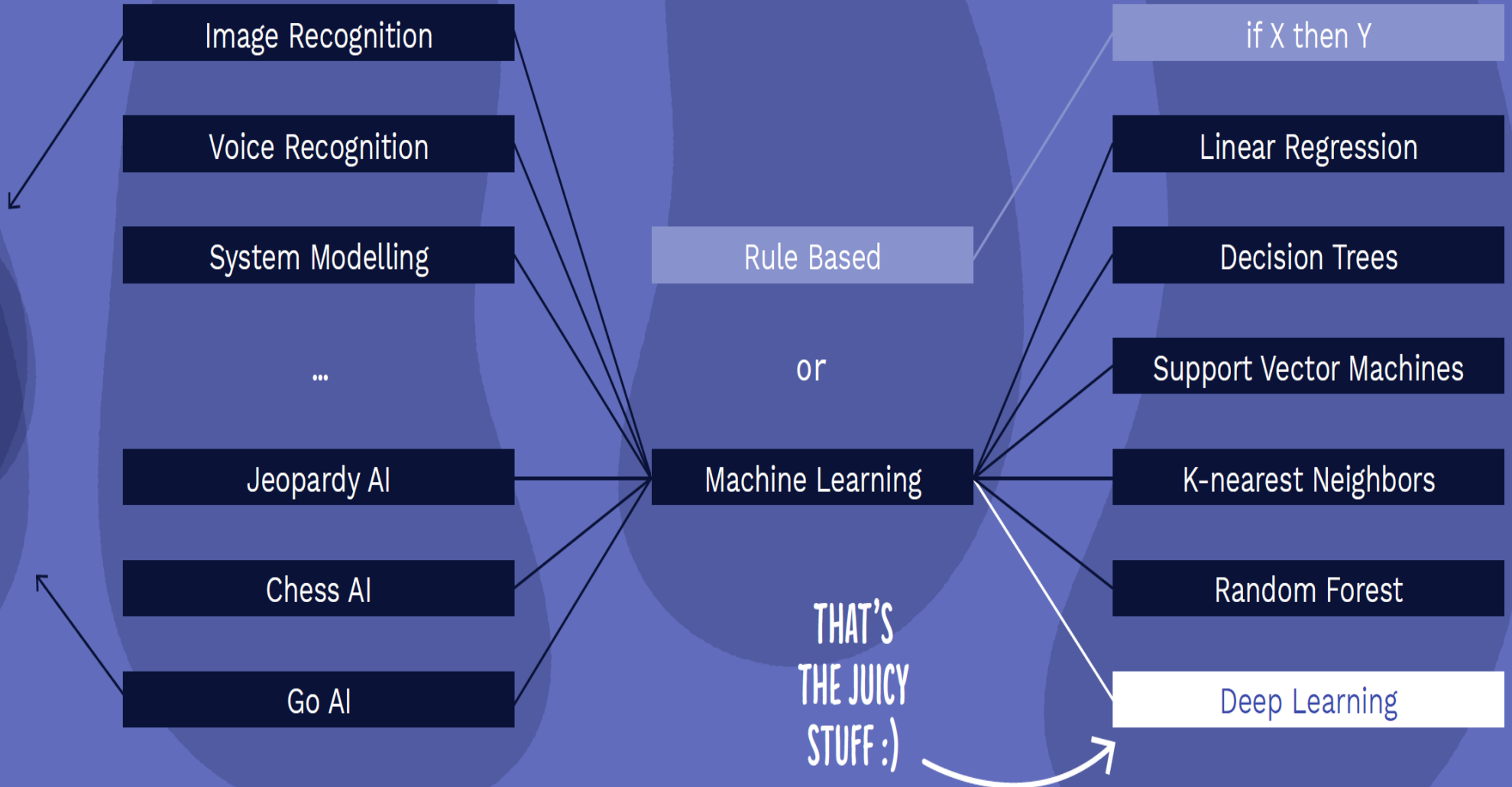
Support Vector Machines

K-nearest Neighbors

Random Forest

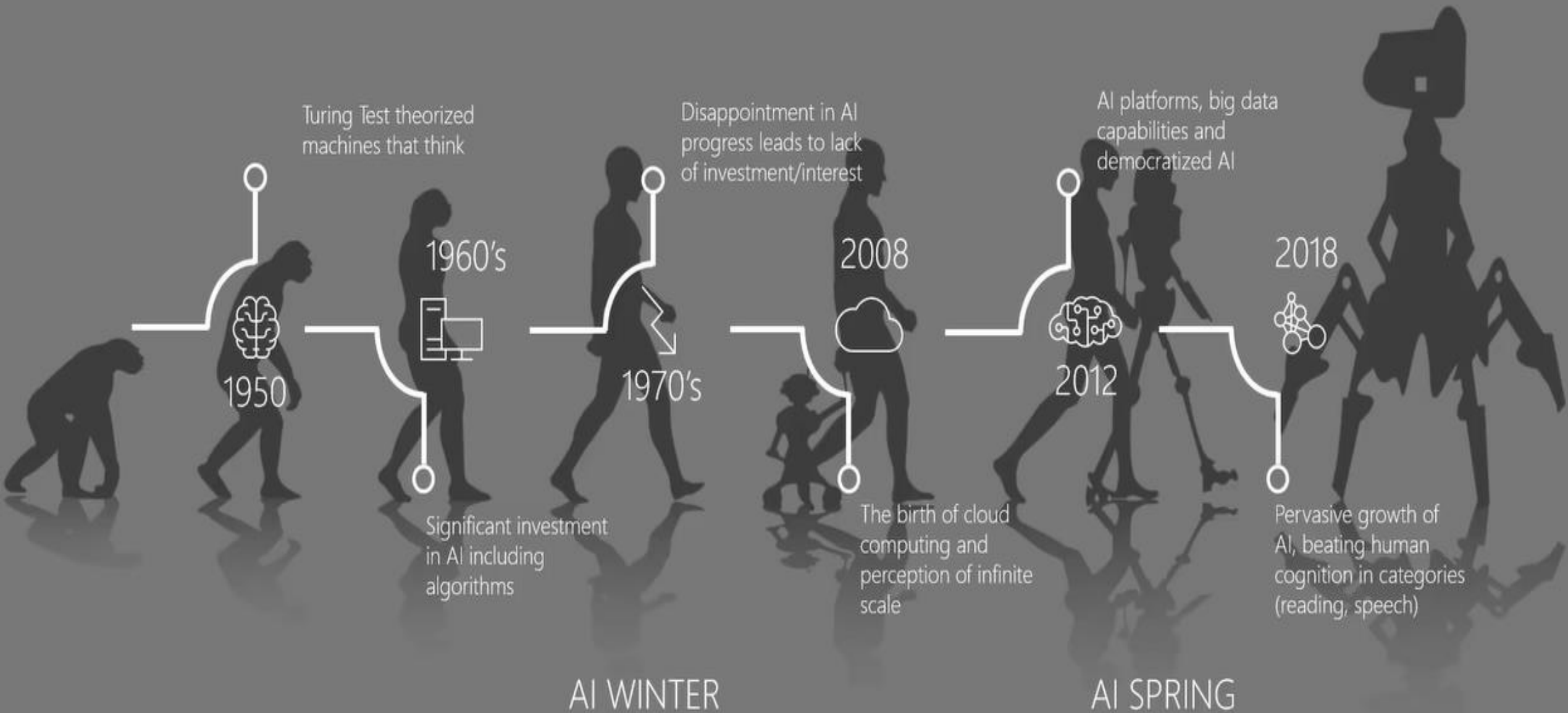
Deep Learning

...



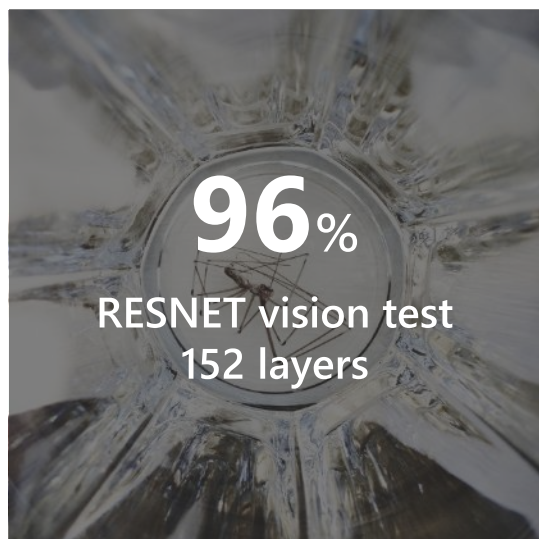


# Evolution of AI



# Microsoft AI Milestones

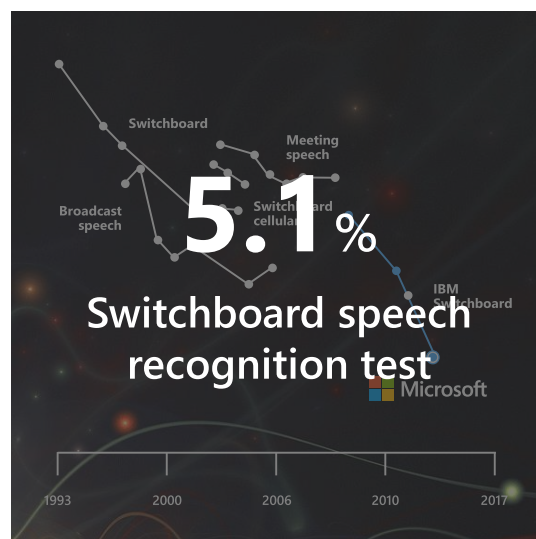
## Vision



2016

**Object Recognition  
Human Parity**

## Speech



2017

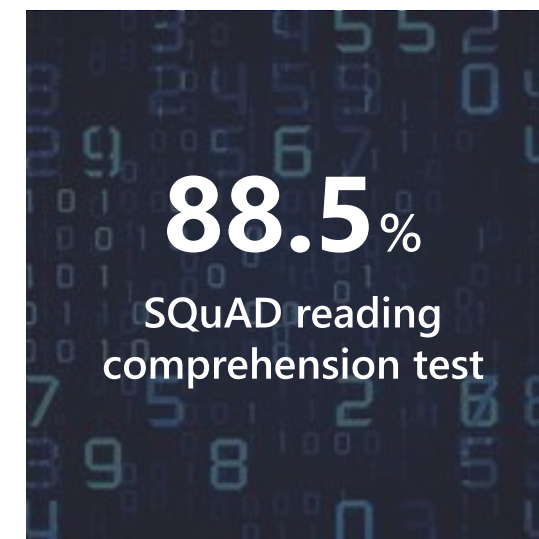
**Speech Recognition  
Human Parity**



March 2018

**Translation  
Human Parity**

## Text



January 2018

**Reading comprehension  
Human Parity**

# Microsoft AI Platform

## Services

### CONVERSATIONAL AI

Bot Framework

### TRAINED SERVICES

Cognitive Services

### CUSTOM SERVICES

Azure Machine Learning

## Tools

### CODING & MANAGEMENT TOOLS

VS Tools  
for AI

Azure ML  
Studio

Azure ML  
Workbench

Others (PyCharm, Jupyter Notebooks...)

### DEEP LEARNING FRAMEWORKS

3rd Party

Cognitive  
Toolkit

TensorFlow

Caffe

Others (Scikit-learn, MXNet, Keras,  
Chainer, Gluon...)

## Infrastructure

### AI ON DATA

Cosmos  
DB

SQL  
DB

SQL  
DW

Data  
Lake

### AI COMPUTE

Spark

DSVM

Batch  
AI

ACS

Edge

CPU, GPU, FPGA+

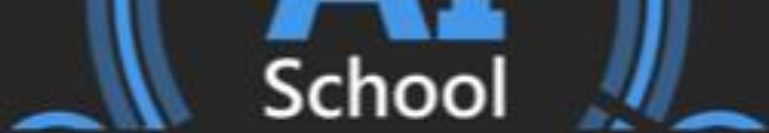


## Custom Vision Service

3 Modules

55min

Beginner



## AI Developer Bootcamp

2 Modules

5hr 38min

Beginner



## Azure Machine Learning Real-world Examples

1 Modules

2hr 50min

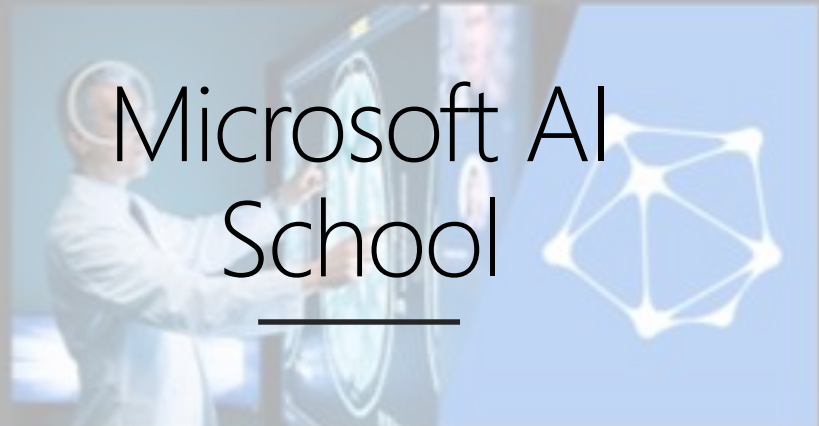
Beginner



## Introduction to Artificial Intelligence (AI)



## Learn Analytics



# Microsoft AI School

## Deep Learning Explained



# Achieving hyper-performance at scale

- Travel number one industry to benefit from AI – *McKinsey*
- Transport and Logistics is the number two industry to benefit from AI - *McKinsey*

Breakdown of use cases by applicable techniques, %



Potential incremental value from AI over other analytics techniques, %



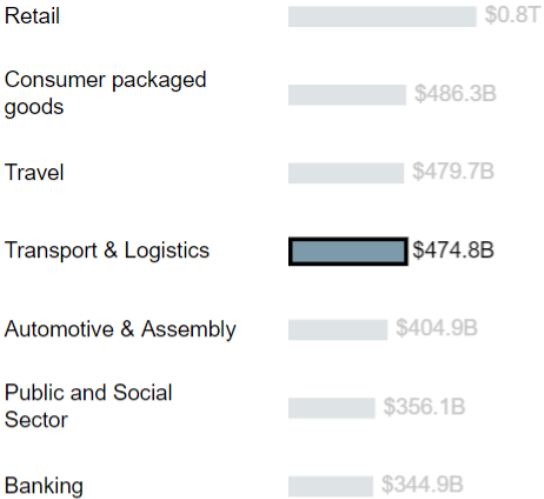
# McKinsey: Uses and impact of AI and other Analytics

Technique: (Multiple values) | Data type: (All) | Problem type: (All)

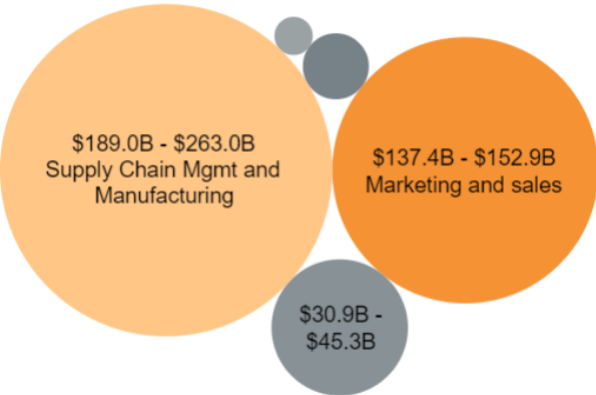
View industries by: Aggregate potential dollar im...

**\$367.5B – \$474.8B**  
total impact shown

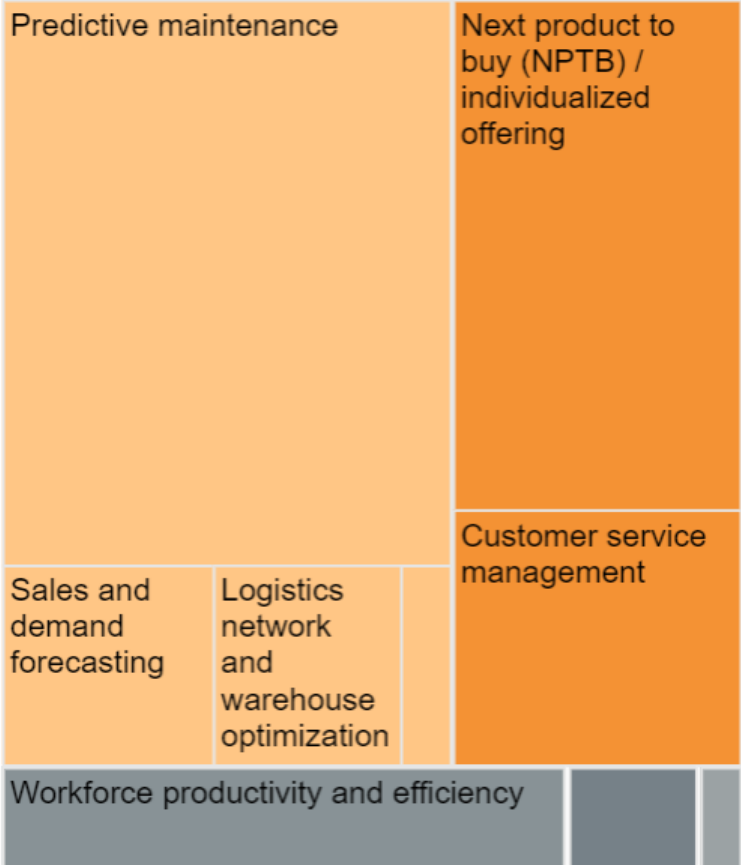
by Industry for  
Function: All  
Business problem: All  
Highest potential impact displayed.  
Hover to view the potential range.



by Function for  
Industry: Transport & Logistics  
Business problem: All  
Click a function to filter  
(Ctrl+ Click for Multiple)

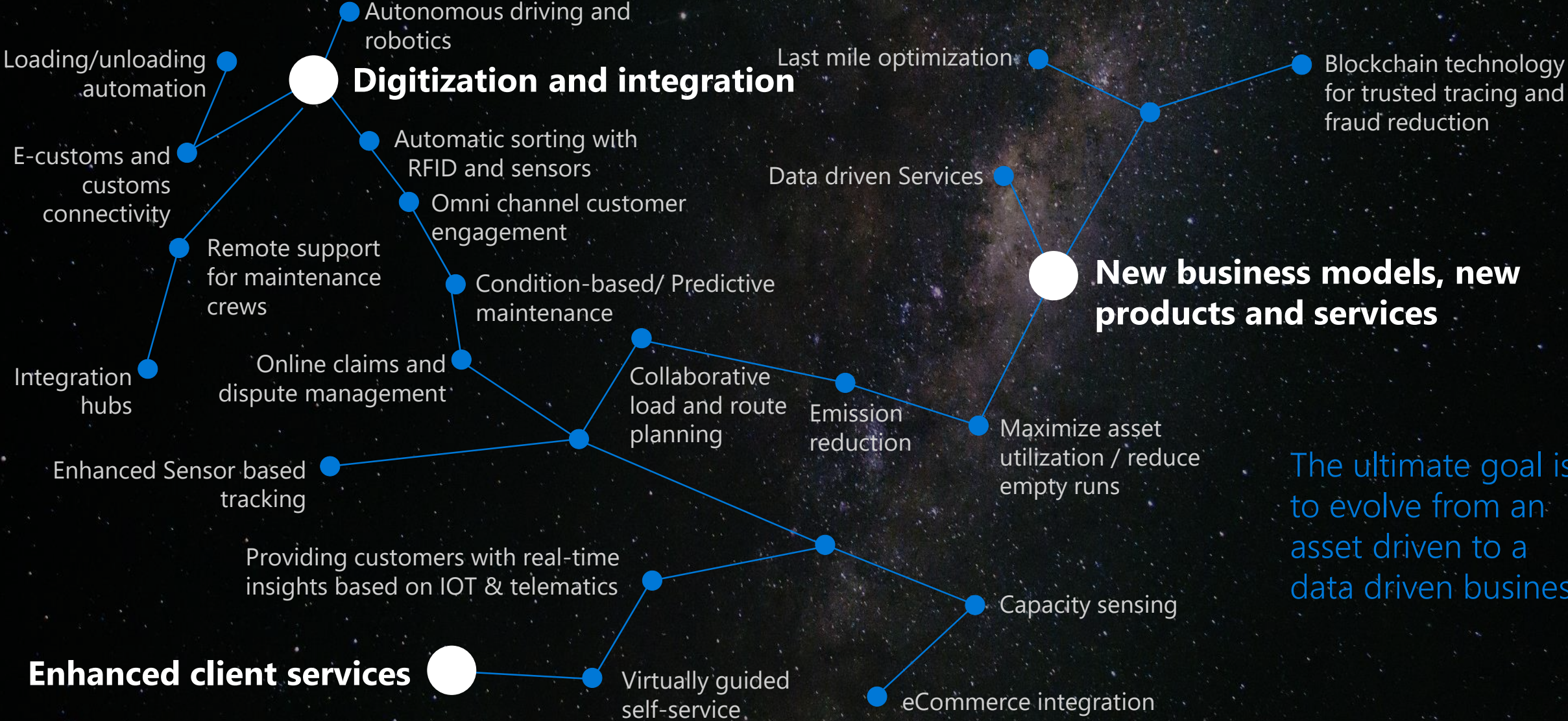


by Business problem for  
Industry: Transport & Logistics  
Function: All





# Where is the transportation industry going?





# OOCL and Microsoft Research team up for AI in shipping



- OOCL processes and analyzes over 30 million vessel data every month. By leveraging deep learning and reinforcement learning, the company develops predictive analytics on vessel schedules and berth activities.
- Target areas are Demand Forecasting, Resource Repositioning, Demand Dispatching and Dynamic Pricing
- Expected annual savings of USD10M in operational costs
- Microsoft assists in training 200 OOCL AI engineers



# Optimize Supply Chain with Demand Prediction

What's the secret to fitting more cargo into fewer ships?

**Challenge** Kotahi relied on a time-consuming manual process to match perishable produce with available shipping space. It needed a quicker, more accurate method to manage its continued rapid business growth.

**Solution** Kotahi decided to automate its demand-forecasting process. The solution, based on R and Azure Machine Learning, uses historic demand data from Microsoft Dynamics AX, Azure SQL Database, and Kotahi's transport management system and helps Kotahi to choose the right-size container ships, at the right times, and dispatch them to the right ports.

**Benefits**

- Reduced demand forecasting from four days to 30 minutes, and boosted accuracy from 80 percent to more than 90 percent.
- Optimized container capacity and improved supply chain efficiency.
- Estimated saving more than US \$1 million in annual supply chain costs.



“Machine Learning can provide new insights that we just didn't have access to before. It can help us discover something that we've never thought of and use that to tune the response so that the customer gets better service.”

— Neville Richardson,  
Group IT Manager at Kotahi





Waberer's International: achieving a whole new level of planning optimization through AI

## OBJECTIVES

Waberer's International Nyrt. has achieved a new industry leading level of truck utilization through AI-powered automation and optimization of a critical business process, order assignment planning

## TACTICS

Business innovation through exploitation of complex mathematical algorithms developed by Nexogen, a Microsoft partner that delivers its unique AI projects on Azure

## RESULTS

- Full automation of mission critical business process
- Performance now above industry best practice - 92% of trucks full on the road, instead of 87%
- Significant annual cost savings due to improved resource allocation
- Reduced chance of scheduling 'human error'
- Greener operation, less fuel used

"92% of the time our trucks are on the road they are now loaded, which means significant annual cost savings for us."

Ferenc Lajkó, Chief Executive Officer, Waberer's International

# Logistical Use Cases for Realtime Computer Vision

Asset Tracking

Optical Quality Control

- Damage / Surface Control
- Control of Completeness

Autonomous Picking

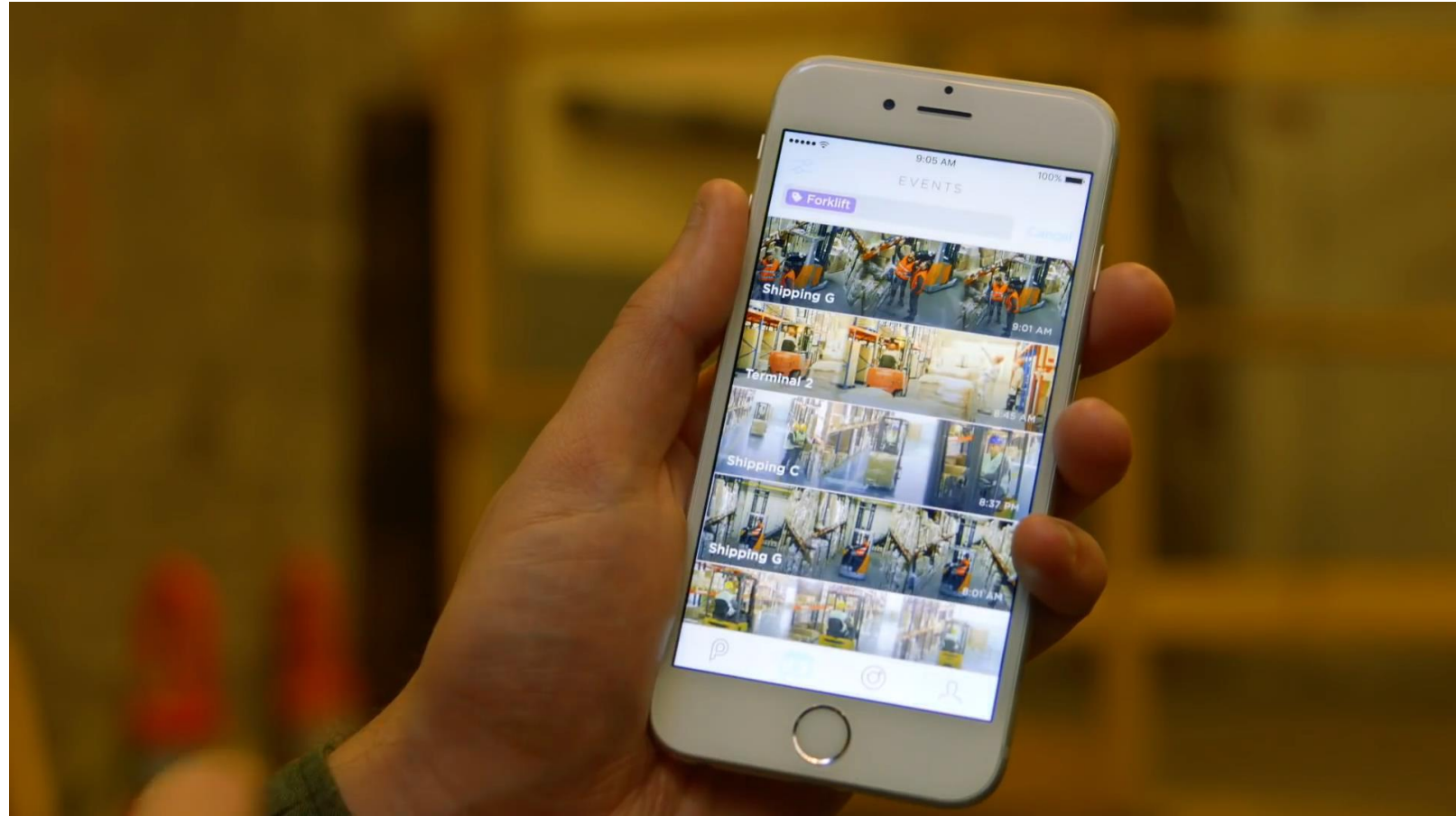
Safety

Visual Monitoring

- Object Counting
- Movement Control
- Location Control
- Error Detection



Deep Learning Modell

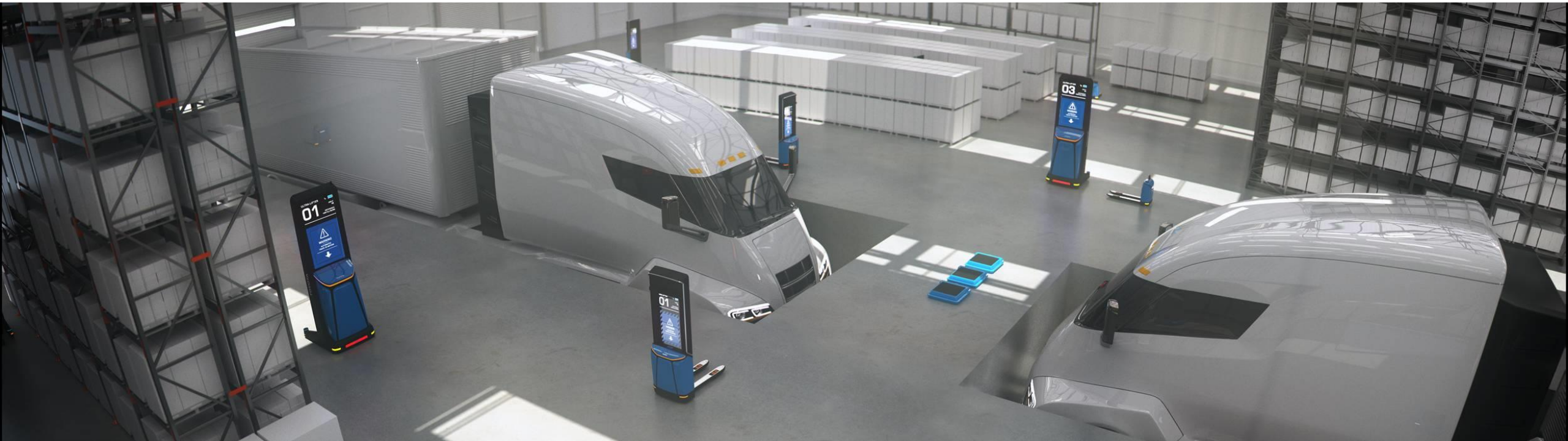




# Artificial Intelligence for Material Handling

## Autonomous staplers and logistics simulation

**TOYOTA**  
MATERIAL HANDLING



At the Hannover Messe show in Germany this week, Toyota presented its vision for a future warehouse with lean logistics and pre-trained, intelligent forklifts. Enabled with machine learning and IoT services in Microsoft Azure, the vehicles can quickly learn navigation in a virtual model of a customer's warehouse, a so-called "digital twin."



## Shipment analysis & optimization

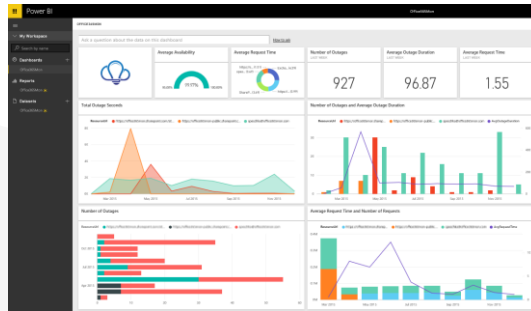


Gewicht durch „Verwiegen“ – betrachten, so würde man, davon gehen Schätzungen aus, **weit mehr als 30 Prozent leere, nicht genutzte Kapazitäten** vorfinden. Daraus folgern nicht-fachkundige Bürger und Politiker, dass **etwa jeder dritte Lkw eingespart werden könnte** – ein Umstand, der Verkehrspolitiker und Umweltschützer auf den Plan ruft und sie die Restrukturierung der wirtschaftsweiten Logistiksysteme fordern lässt.

© Schmidt, Sina. *Konzeption einer nachhaltigen Balanced Scorecard für Logistikdienstleister*. GRIN Verlag, 2019.

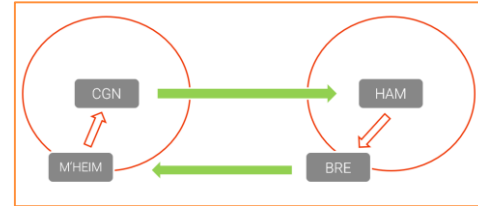
# Shipment analysis & optimization

## Overview dashboard



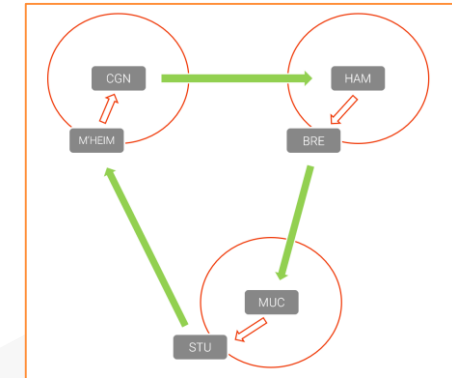
- Consistent data model for explorative analysis
- Analysis of routes, customers & industries
- Potential businesses & optimization potential

## Backshipment selection



- Find matching backshipments within a milage / cost range
- Avoid empty truck loads with little changes of the original road

## Triangulation



- Find additional shipments to create an optimized route
- Can be further extended

Usable for existing business & sales

# Document extraction

**Muster Firma**  
Muster Straße 1, 12345 Musterstadt

Muster Firma - Muster Straße 1 - 12345 Musterstadt  
Muster Straße 1  
12345 Musterstadt  
Germany

Herrn  
Max Mustermann  
Muster Straße 1  
12345 Musterstadt  
Germany

Datum 17.07.2018  
Kunde 10018  
Rechnung 2018328

Sehr geehrter Herr Mustermann,  
nachfolgend berechnen wir Ihnen wie vorab besprochen:

**Rechnung 2018328.**  
Das Rechnungsdatum entspricht dem Leistungsdatum

Art-Nr.	Bezeichnung	Menge	Einzelpreis	Betrag
10001	Außenfassade streichen, inkl. Materialkosten	8,5 Std	131,59	1.118,52 €
Nettobetrag				939,93 €
Umsatzsteuer 19%				178,59 €
<b>Rechnungsbetrag</b>				<b>1.118,52 €</b>

Vielen Dank für Ihren Auftrag!  
Bitte begleichen Sie den offenen Betrag bis zum 22.07.2018.  
Mit freundlichen Grüßen  
Muster Firma

Zahlungsempfänger  
Bankverbindung

Max Mustermann  
Musterbank  
BIC BICBICBIC, IBAN DE 12 3456 7890 1011 12

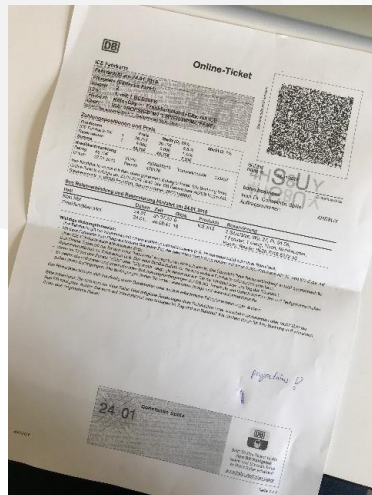
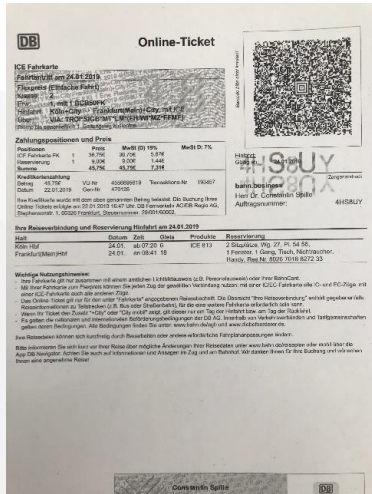


Überweise 1.118,52 € an die  
IBAN 12 3456 7890 1011 12

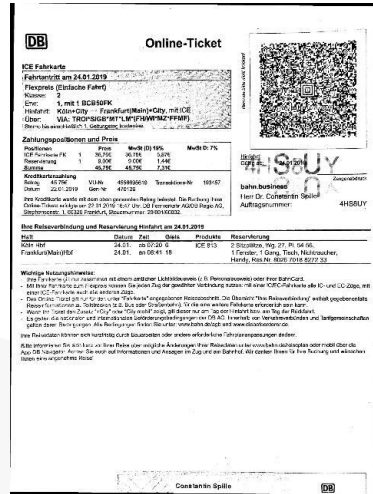


# Document extraction

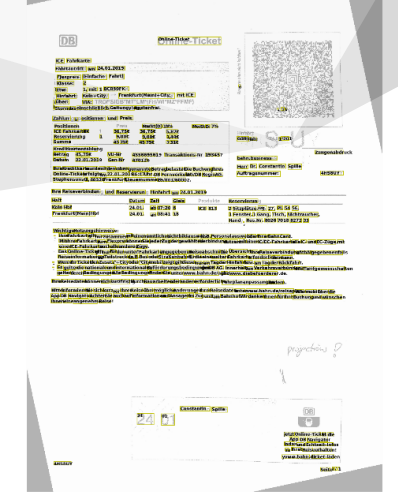
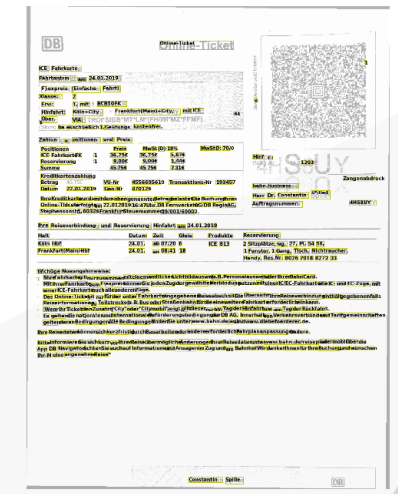
## Picture of ticket



## Enhanced Image



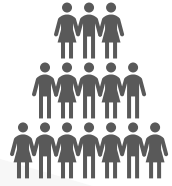
## Recognized Text





# Query Management

Customer feedback



Speech



Language understanding



Query Management



Sentiment



Categories



# Query Management – Speech-to-text extension

