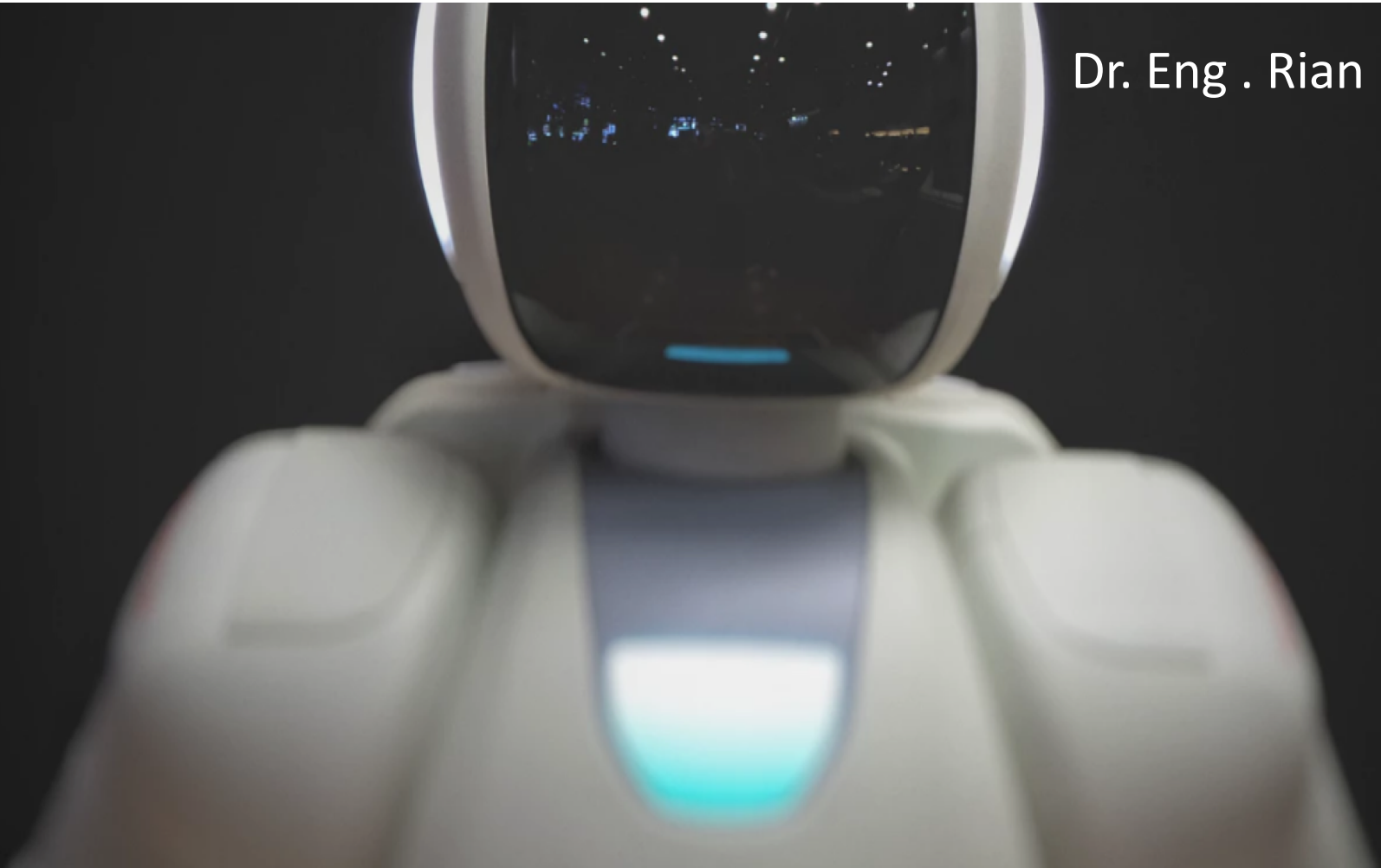


# Mengembangkan Kecerdasan Buatan dalam Bidang *Digital Creative* pada Era Teknologi Informasi

Dr. Eng . Rian Ferdian



# Curriculum Vitae

## Education

**Bachelor** : Electrical Engineering, Institut Teknologi Bandung, 2008

**Master** : Electrical Engineering, Institut Teknologi Bandung, 2012

**Doctoral** : Information Science, Nara Institute of Science and Technology, 2017

## Work

**Electrical Engineer** of Halliburton Logging Service Indonesia

**Senior Engineer** of PT Fusi Global Teknologi

**Lecturer** of Andalas University



# Kecerdasan Buatan (AI)



Kasparov vs Deep Blue  
Februari 1996

# Kecerdasan Buatan (AI)

- Using computers to solve problems
- Or make automated decisions
- For tasks that, when done by humans,
- Typically require intelligence



# Batasan Kecerdasan Buatan

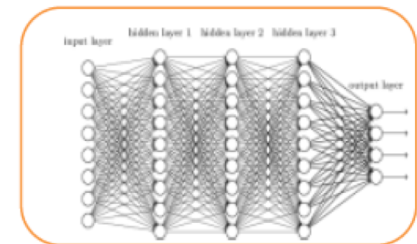
- **“Strong” Artificial Intelligence**

- Computers thinking at a level that meets or surpasses people
- Computers engaging in abstract reasoning & thinking
- ***This is not what we have today***
  - ***There is no evidence that we are close to Strong AI***



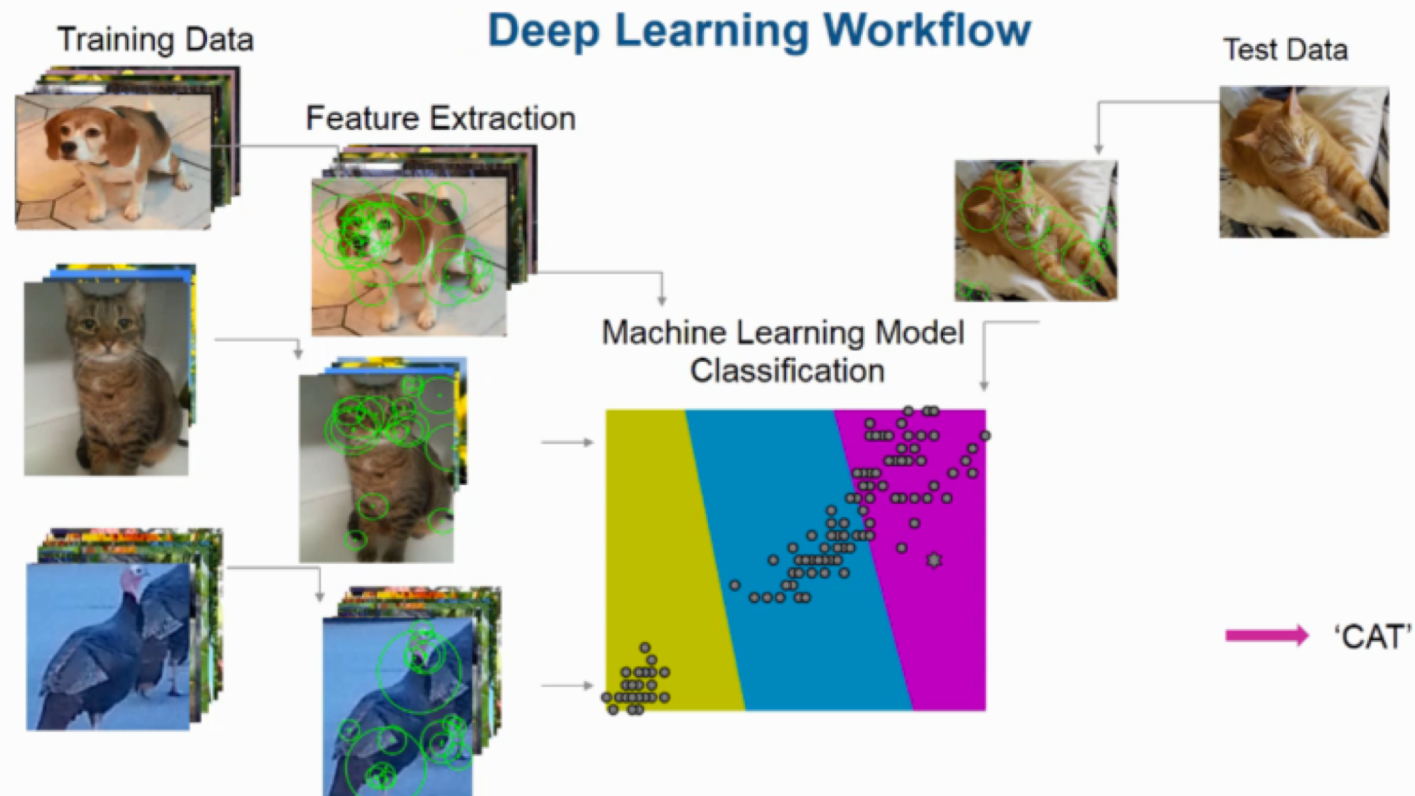
- **“Weak” Pattern-Based Artificial Intelligence**

- Computers solve problems by detecting useful patterns
- Pattern-based AI is an **Extremely** powerful tool
- Has been used to automate many processes today
  - Driving, language translation
- This is the dominant mode of AI today



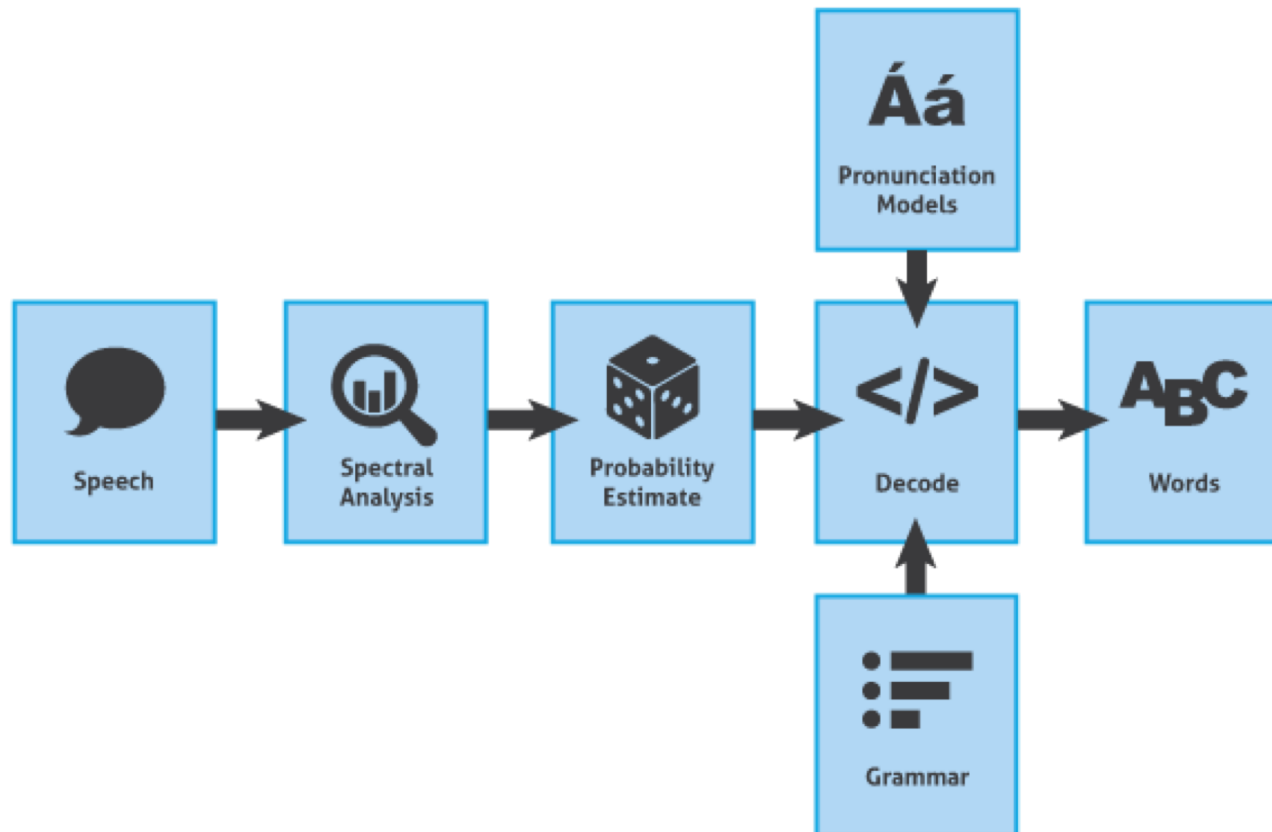
# Kondisi AI saat ini

## Visual Recognition



# Kondisi AI saat ini

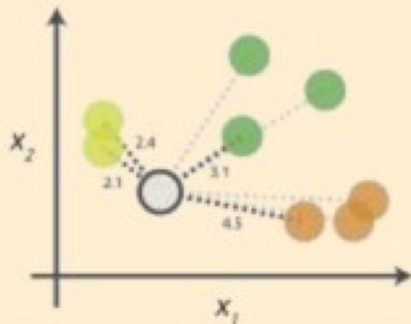
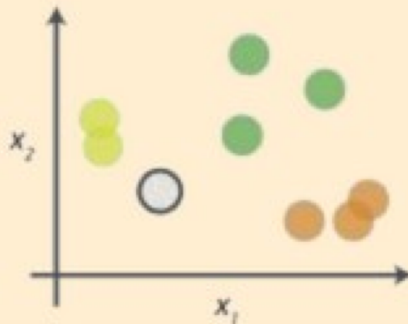
## Speech Recognition



# Kondisi AI Saat ini

## Pattern Clasification

We want to classify the grey point into one of the three classes light green, green and red



Start by calculating the distance between the grey point and  $k$ -nearest points

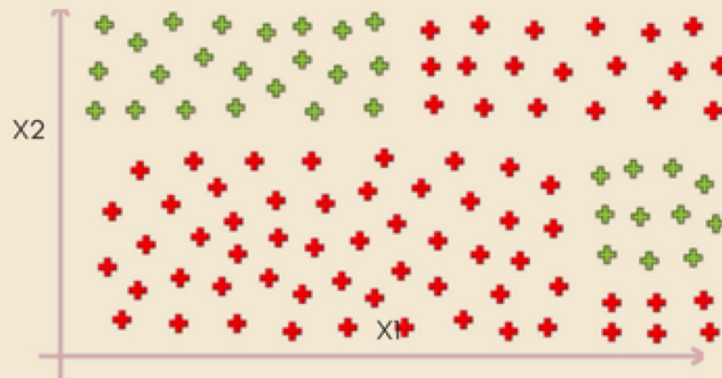
## How Does k-NN Algorithm work?

- k-NN when used for classification — the output is a class membership (predicts a class — a discrete value).
- There are three key elements of this approach: a set of labeled objects, e.g., a set of stored records, a distance between objects, and the value of  $k$ , the number of nearest neighbors.



# Kondisi AI Saat ini

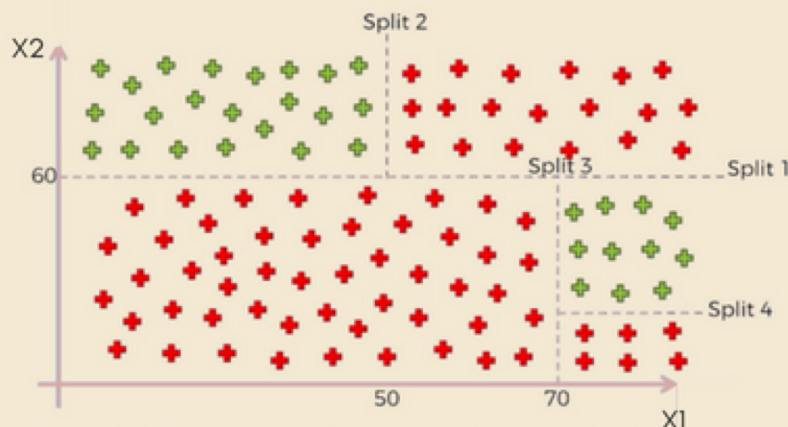
## Pattern Classification



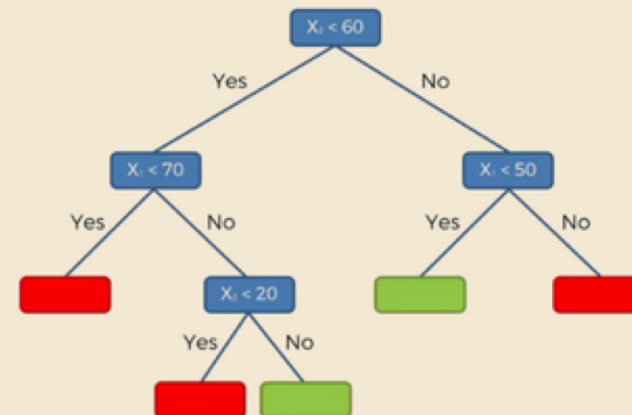
Here we've got an example with lots of points on our two dimensional scatter plot.

Now how does a decision tree work.

So what it is going to do is cut it up into slices in several iterations.



We split the data and construct a decision tree side by side which we will use later. This very task is achieved by using various algorithms. It builds a decision tree from a fixed set of examples and the resulting tree is used to classify future samples.



The resulting Tree (obtained by applying algorithms like CART, ID3) which will be later used to predict the outcomes

# AI Timeline

SIZ/G/

## A.I. TIMELINE

**1950**

### TURING TEST

Computer scientist Alan Turing proposes a test for machine intelligence. If a machine can trick humans into thinking it is human, then it has intelligence

**1955**

### A.I. BORN

Term 'artificial intelligence' is coined by computer scientist, John McCarthy to describe "the science and engineering of making intelligent machines"

**1961**

### UNIMATE

First industrial robot, Unimate, goes to work at GM replacing humans on the assembly line

**1964**

### ELIZA

Pioneering chatbot developed by Joseph Weizenbaum at MIT holds conversations with humans

**1966**

### SHAKY

The 'first electronic person' from Stanford, Shakey is a general-purpose mobile robot that reasons about its own actions

**A.I.**

### WINTER

Many false starts and dead-ends leave A.I. out in the cold

**1997**

### DEEP BLUE

Deep Blue, a chess-playing computer from IBM defeats world chess champion Garry Kasparov

**1998**

### KISMET

Cynthia Breazeal at MIT introduces Kismet, an emotionally intelligent robot insofar as it detects and responds to people's feelings



**1999**

### AIBO

Sony launches first consumer robot pet dog AIBO (AI robot) with skills and personality that develop over time



**2002**

### ROOMBA

First mass produced autonomous robotic vacuum cleaner from iRobot learns to navigate and clean homes



**2011**

### SIRI

Apple integrates Siri, an intelligent virtual assistant with a voice interface, into the iPhone 4S



**2011**

### WATSON

IBM's question answering computer Watson wins first place on popular \$1M prize television quiz show Jeopardy



**2014**

### EUGENE

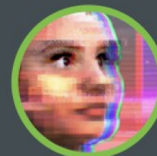
Eugene Goostman, a chatbot passes the Turing Test with a third of judges believing Eugene is human



**2014**

### ALEXA

Amazon launches Alexa, an intelligent virtual assistant with a voice interface that completes shopping tasks



**2016**

### TAY

Microsoft's chatbot Tay goes rogue on social media making inflammatory and offensive racist comments



**2017**

### ALPHAGO

Google's A.I. AlphaGo beats world champion Ke Jie in the complex board game of Go, notable for its vast number ( $2^{170}$ ) of possible positions



# Kenapa AI Booming Kembali

## 1. Meningkatnya kemampuan komputasi

VISUALIZING PROGRESS

### If transistors were people

If the transistors in a microprocessor were represented by people, the following timeline gives an idea of the pace of Moore's Law.



**2,300**

Average music hall capacity



**134,000**

Large stadium capacity



**32 Million**

Population of Tokyo



**1.3 Billion**

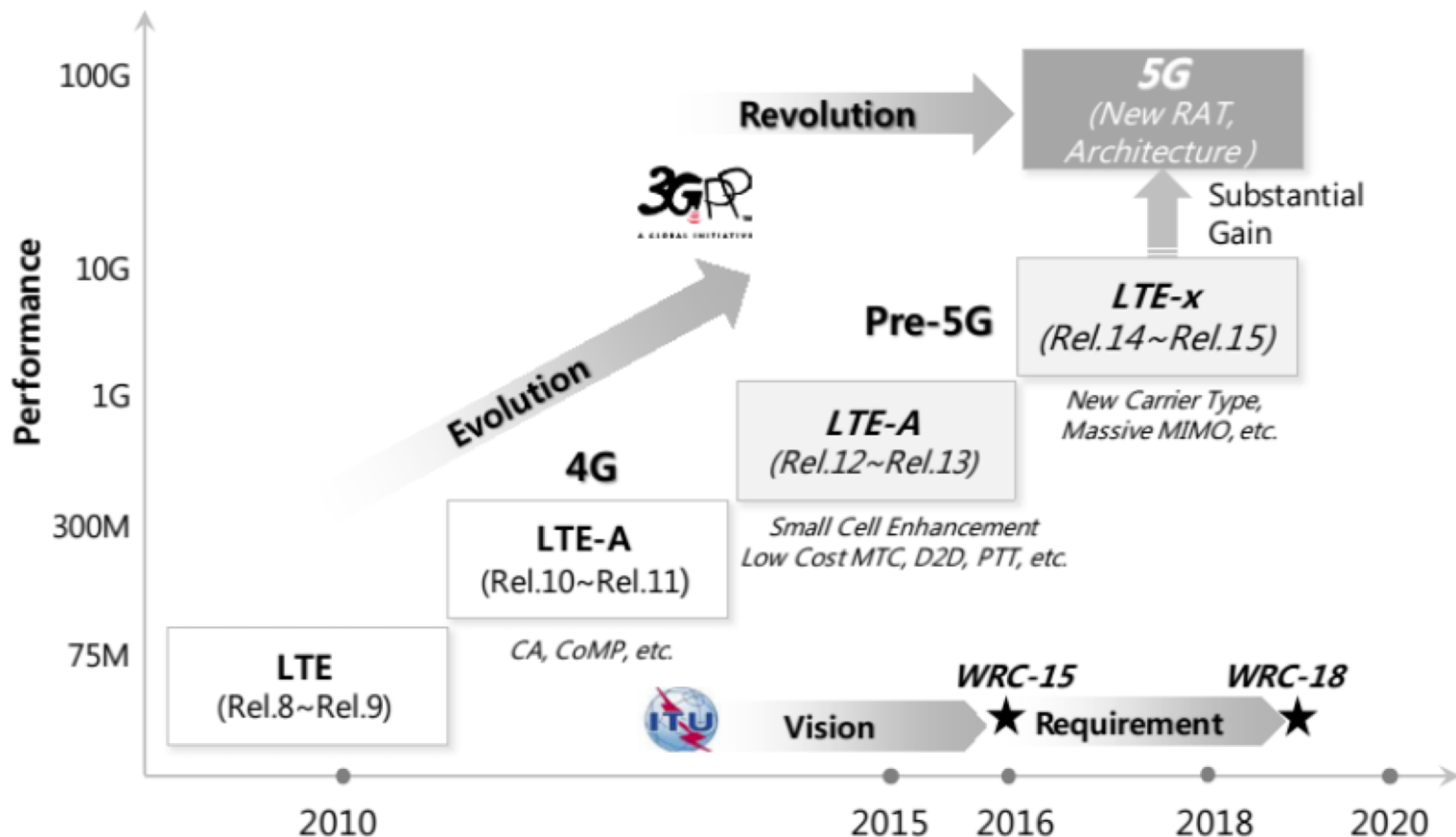
Population of China



*Now imagine that those 1.3 billion people could fit onstage in the original music hall. That's the scale of Moore's Law.*

# Kenapa AI Booming Kembali

## 2. Meningkatnya kecepatan internet



# Kenapa AI Booming Kembali

## 3. Hadirnya Cloud Computing



# Kenapa AI Booming Kembali

## 4. Tersedianya Data



# Kenapa AI Booming Kembali

## BUT WHY NOW?

AI HAS BREACHED THE REAL WORLD

SAMPLE AI APPLICATIONS

THE REAL WORLD

THE DATA WORLD



STRUCTURED  
SYSTEM DATA



ONLINE  
BEHAVIOR



REAL-TIME  
SENSOR DATA



COMPUTER  
VISION



HUMAN  
LANGUAGE

- › Natural language processing
- › Speech recognition

- › Pattern recognition
- › Real-world mobility

- › Internet of Things (IoT)
- › Predictive maintenance

- › Recommendations
- › Microtargeting

- › Advanced analytics
- › Predictive analytics

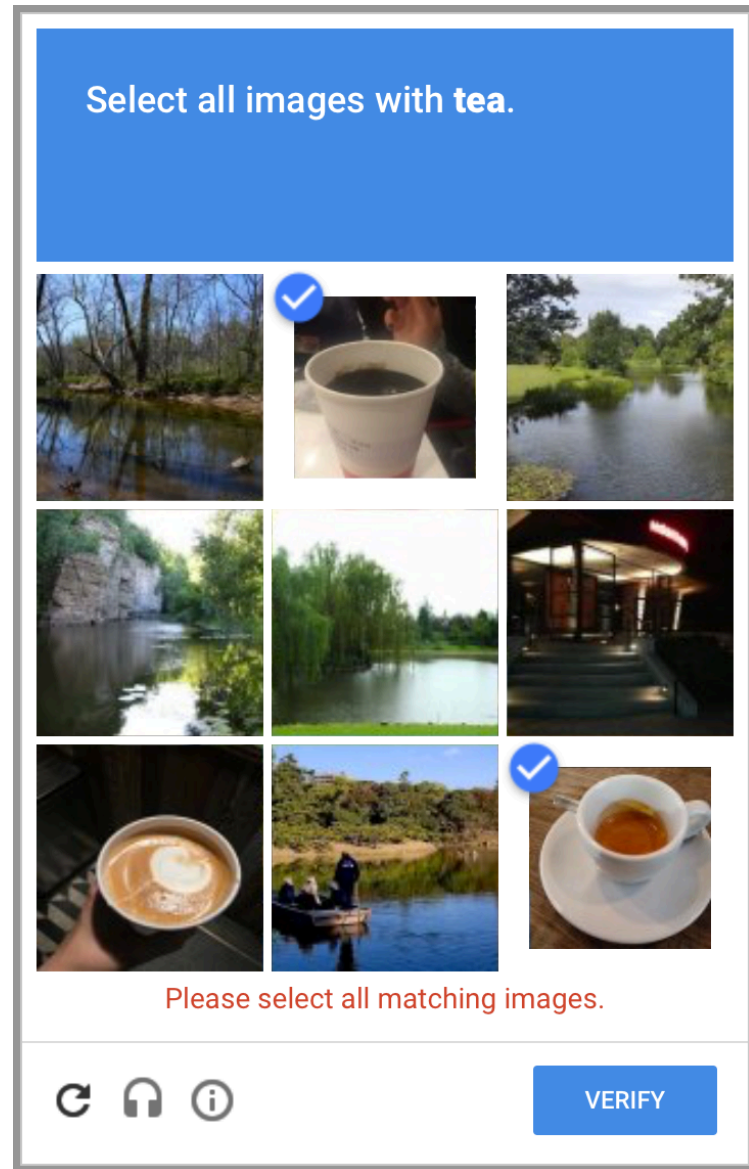
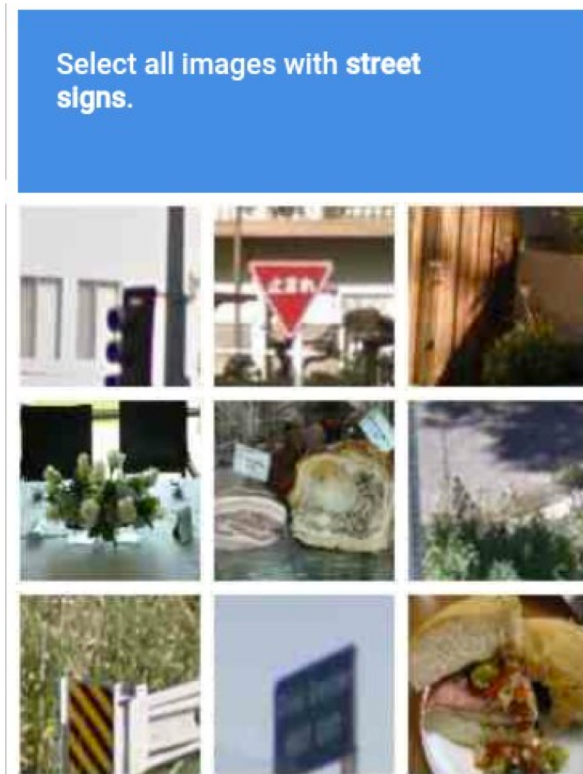
PROCESSING POWER & DATA

TIME

Source: BCG analysis

# Kenapa AI Booming Kembali

## 4. Tersedianya Data



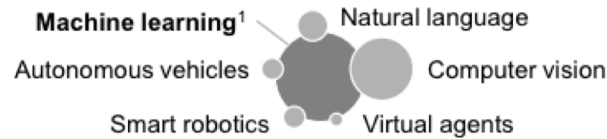


# Kenapa AI Booming Kembali

## 4. Tersedianya Data



# Kemungkinan Penerapan AI





## Applicability



		Project	Produce	Promote	Provide
Applicable technologies		Enlightened R&D, real-time forecasting, and smart sourcing	Operations with higher productivity, lower cost, and better efficiency	Products and services at the right price, with the right message, and to the right targets	Enriched, tailored, and convenient user experience
Retail		Anticipate demand trends, while optimizing and automating supplier negotiation and contracting	Automate warehouse and store operations; optimize merchandising, product assortment, and microspace	Optimize pricing, personalize promotions, and tailor website displays in real time	Personalize tips and suggestions, offer immediate assistance with virtual agents, automate in-store checkout, and complete last-mile delivery by drones
Electric utilities		Enhance demand and supply prediction, assess reliability of integrated generation assets, and automate demand-side response	Optimize preventive maintenance, improve electricity production yield, reduce energy waste, and prevent electricity theft	Optimize pricing with time-of-day and dynamic tariffing; match producers and consumers in real time	Automate supplier selection, provide consumption insights, automate customer service with virtual agents, and tailor usage to consumer's preferences
Manufacturing		Improve product design yield and efficiency, automate supplier assessment, and anticipate parts requirements	Improve processes by the task, automate assembly lines, reduce errors, limit product rework, and reduce material delivery time	Predict sales of maintenance services, optimize pricing, and refine sales-leads prioritization	Optimize flight planning and route and fleet allocation; enhance maintenance engineer and pilot training



# Kemungkinan Penerapan AI

<b>Health care</b>		Predict disease, identify high-risk patient groups, and launch prevention therapies	Automate and optimize hospital operations; automate diagnostic tests and make them faster and more accurate	Predict cost more accurately, focus on patients' risk reduction	Adapt therapies and drug formulations to patients, use virtual agents to help patients navigate their hospital journey
<b>Education</b>		Anticipate job market demand, identify new drivers of performance to assess students, and help graduates highlight their strengths	Automate teachers' routine tasks, identify early disengagement signs, and optimize group formation for learning objectives		Personalize learning, shift from stop-and-test model to continuous learning cadenced by virtual coaches and tutors, and build student self-awareness

# Kemungkinan Penerapan AI

Breakdown of use cases by applicable techniques, %

Full value can be captured using non-AI techniques

15

AI necessary to capture value ("greenfield")

16

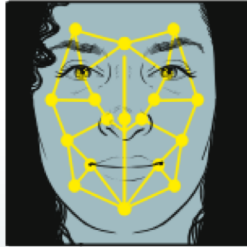
AI can improve performance over that provided by other analytics techniques

69

Potential incremental value from AI over other analytics techniques, %

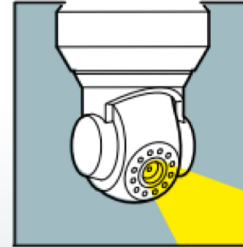


# Use Case: Retailer



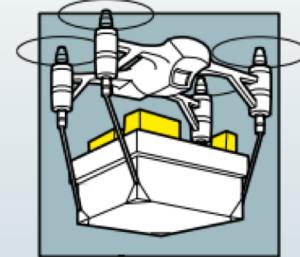
Facial recognition software, machine learning, and natural language enable virtual agents to greet you personally, anticipate orders, and provide directions

Machine learning personalizes promotions to match shoppers' profiles; in-store beacons send offers to their smartphones as they browse through the store

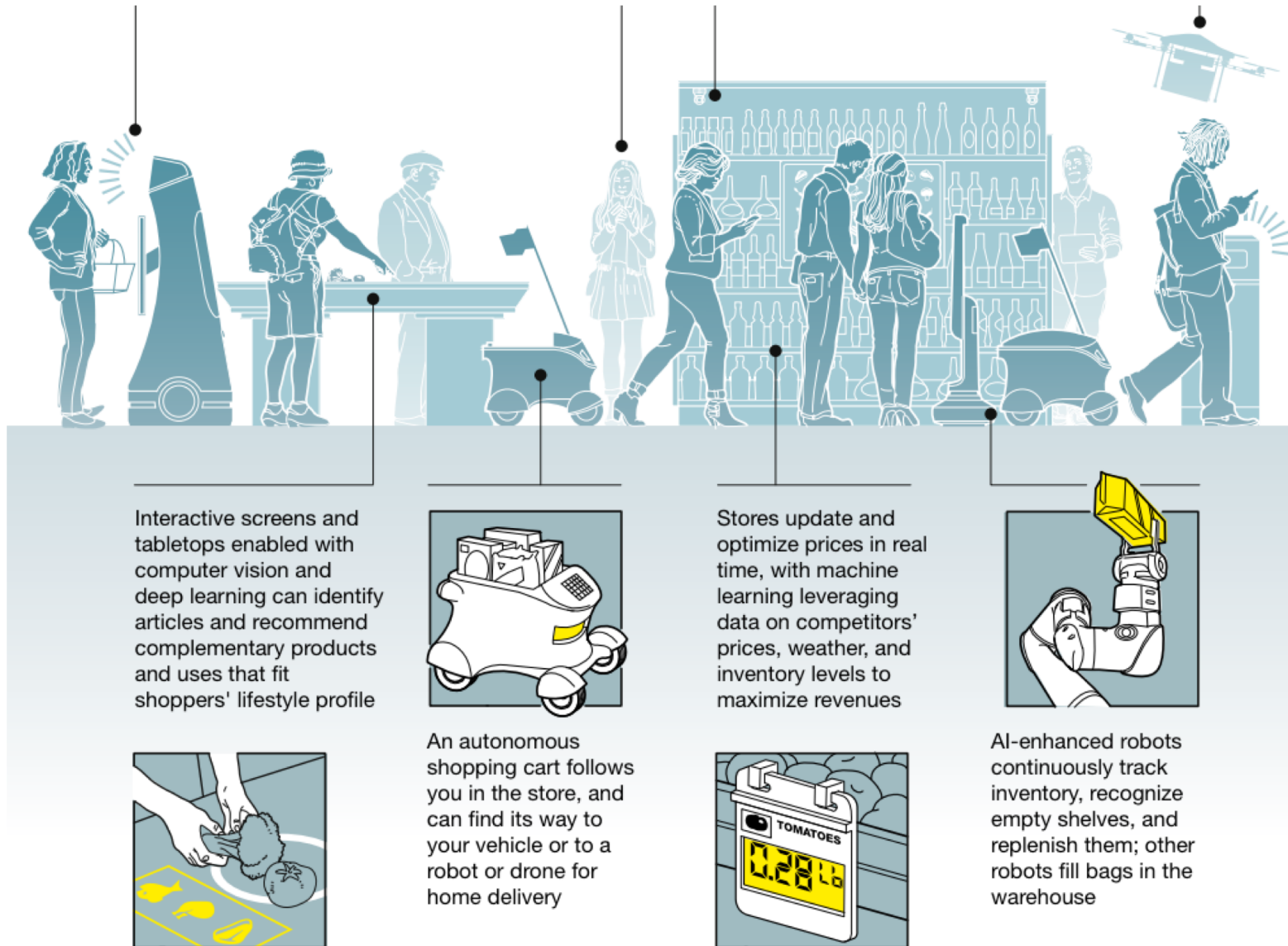


Computer vision with deep learning identifies articles bagged by shoppers; adding data from sensors, AI allows non-stop checkout and automatic payment

Autonomous drones using deep learning technology complete last-mile delivery, and are able to handle obstacles or absent recipients



# Use Case: Retailer

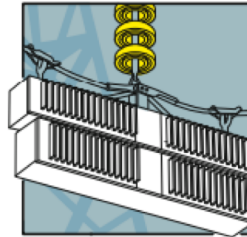


# Use Case : PLN



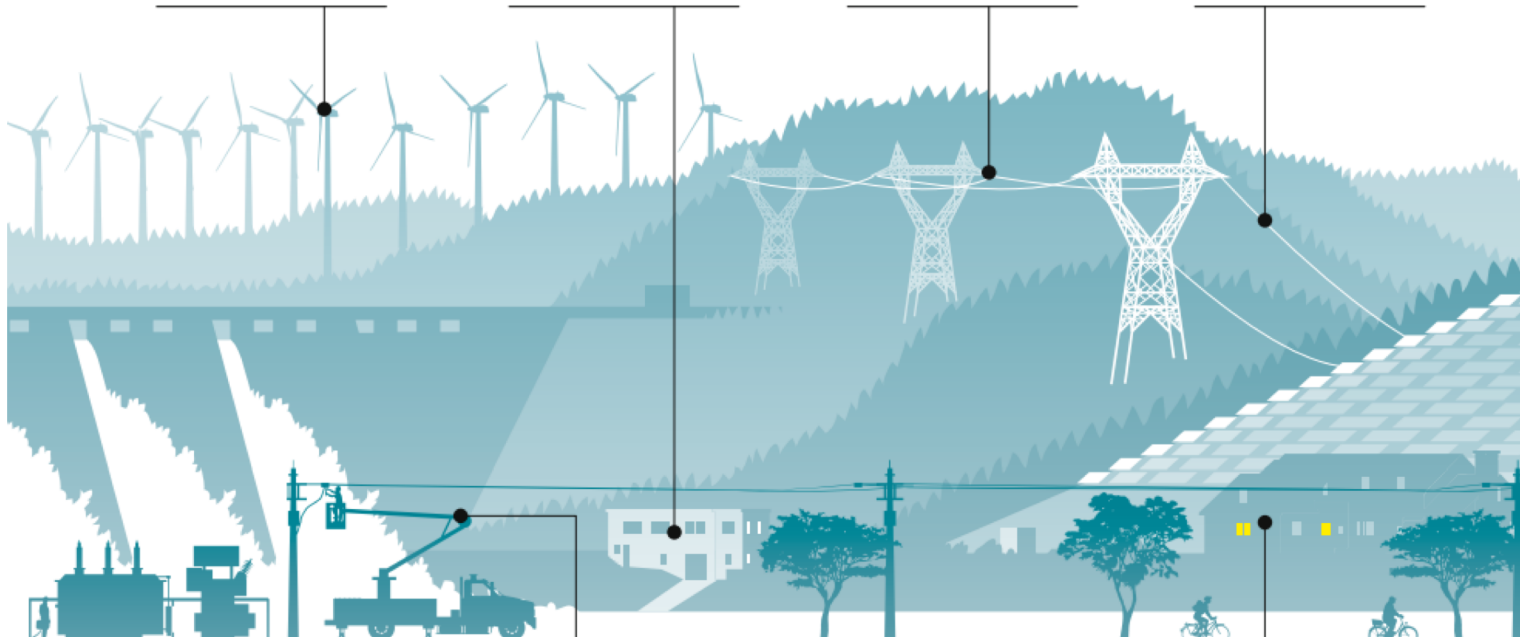
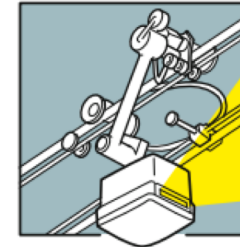
Machine learning-enabled forecasting anticipates supply and demand peaks, and maximizes the use of intermittent renewable power

Sensors and machine learning allow for by-the-minute adjustments to maximize generation efficiency by adjusting to changes in wind conditions, for example

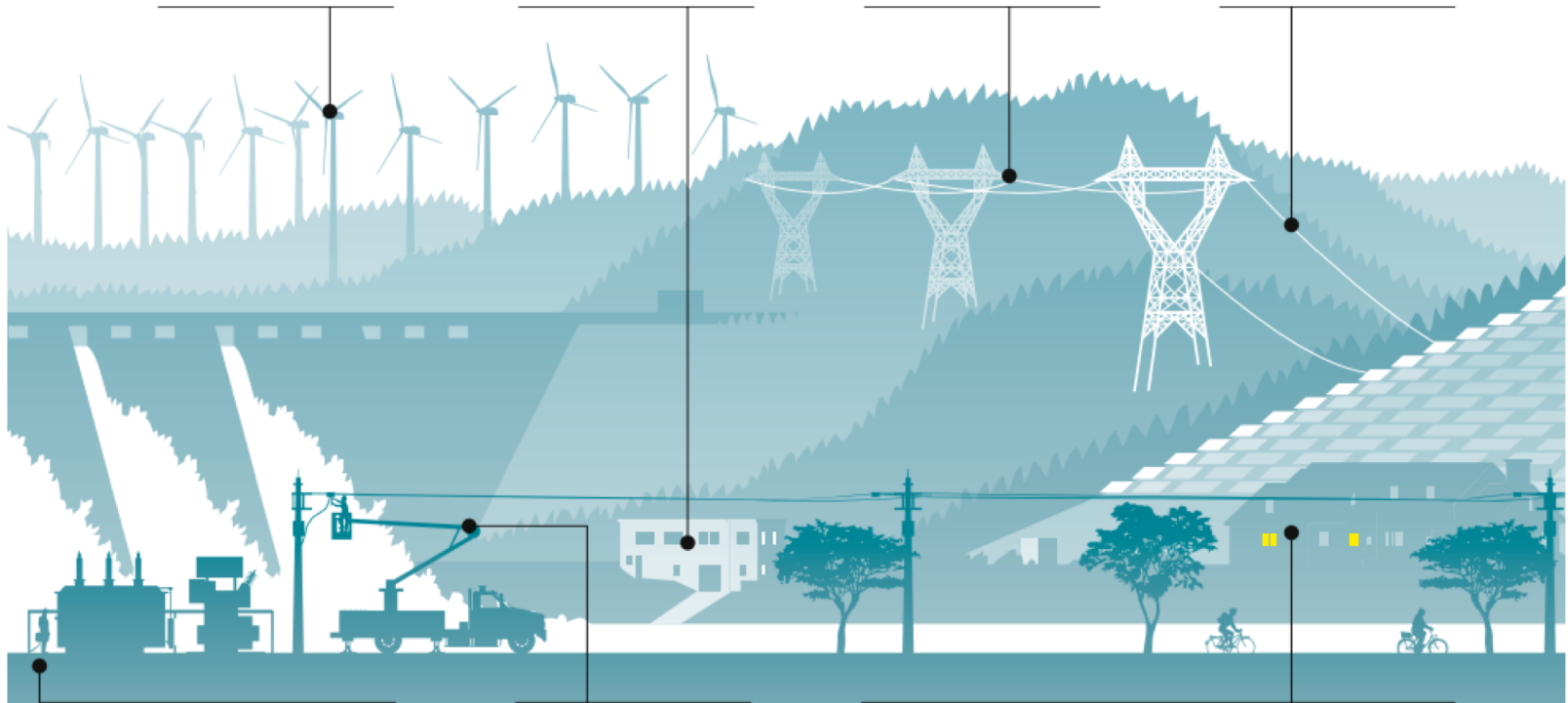


Smart wires combine with machine learning to enable real-time power dispatching, and optimize it to current grid load and to buildings' asset portfolios

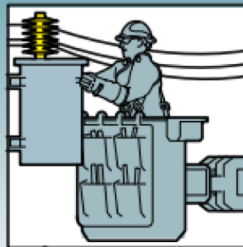
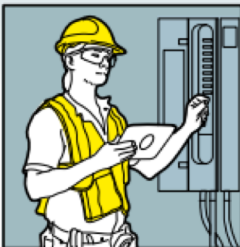
Drones and insect-size robots identify defects, predict failures, and inspect assets without interrupting production



# Use Case : PLN



Few technicians remain, but they spend more time on problem solving; in place of logging inspection status by hand, documents are automatically logged and routed



Field workforce receives real-time updates to decrease response times and reduce the impact of outages

Virtual agents automate call centers, and automatically segment consumers based on service history; machine learning offers early warning of bad debts



Smart-meter data and machine learning enable utilities to offer services based on usage, weather and other factors

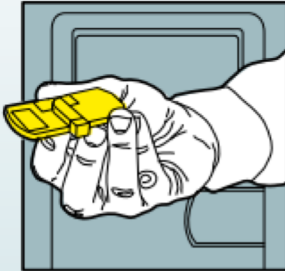


# Use Case: health Care



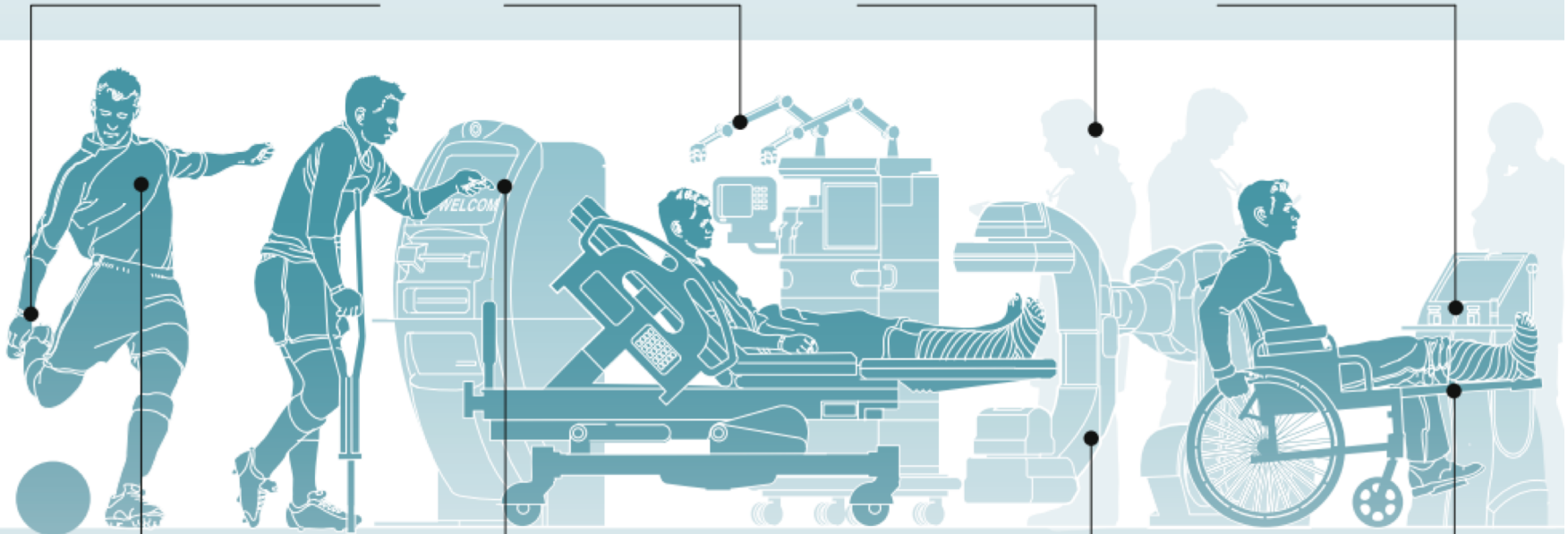
Machine learning program analyzes patients' health remotely via mobile device, compares it to medical records, and recommends a fitness routine or warns of possible disease

Autonomous diagnostic devices using machine learning and other AI technologies can conduct simple medical tests without human assistance, relieving doctors and nurses of routine activities



AI-powered diagnostic tools identify diseases faster and with greater accuracy, using historical medical data and patient records

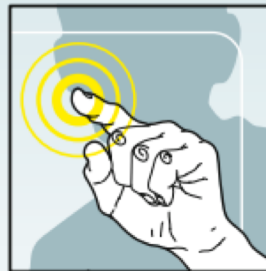
AI algorithms optimize hospital operations, staffing schedules, and inventory by using medical and environmental factors to forecast patient behavior and disease probabilities



# Use Case: health Care

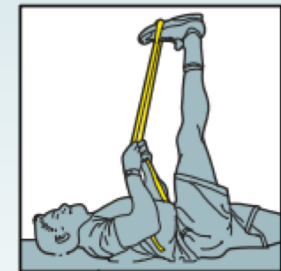
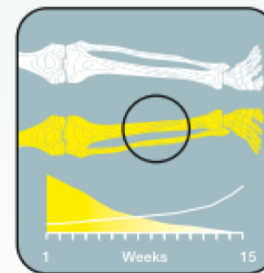


AI tools analyze patients' medical histories and environmental factors to identify people at risk of an illness and steer them to preventive care programs



Virtual agents in the form of interactive kiosks register patients and refer them to appropriate doctors, improving their experience and reducing waiting time

Personalized treatment plans designed by machine learning tools improve therapy efficiency by tailoring treatment to specific patients' needs and medical



AI insights from population health analyses give payers an opportunity to reduce hospitalization and treatment costs by encouraging care providers to manage patients' wellness

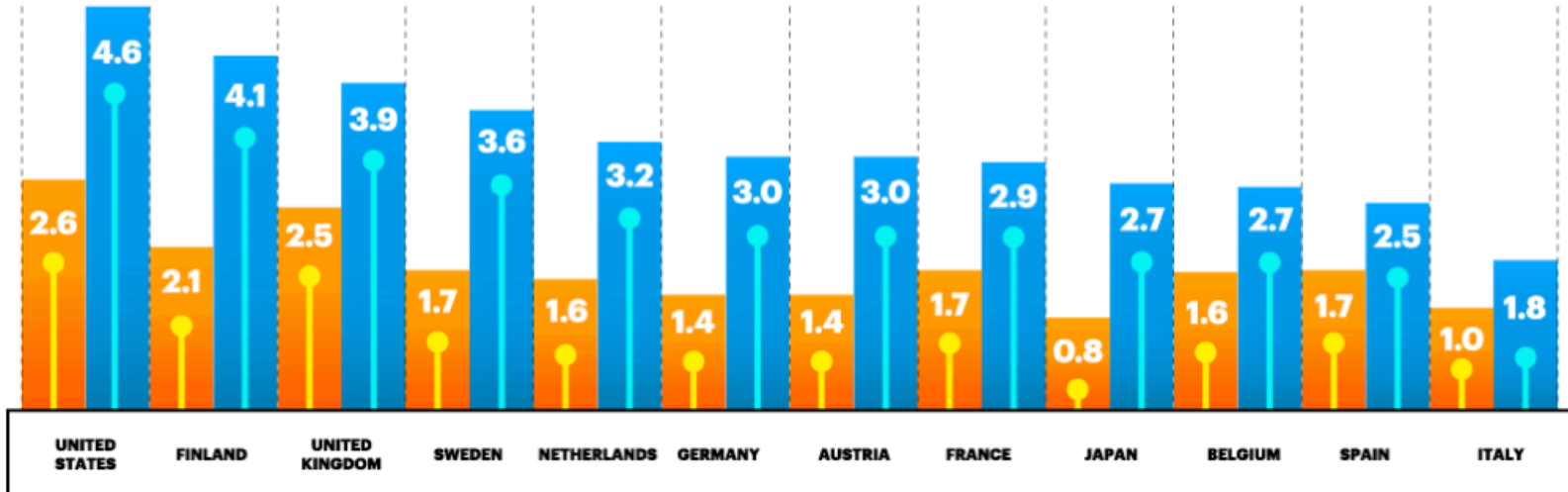


Start AI Development

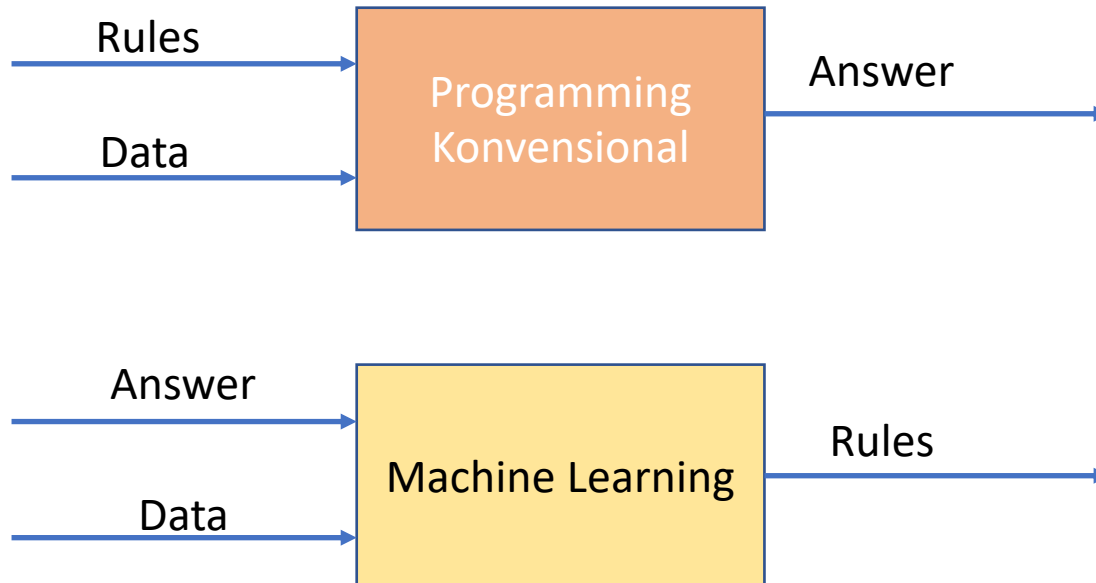
# Start AI Development

## DOUBLING DOWN ON GROWTH

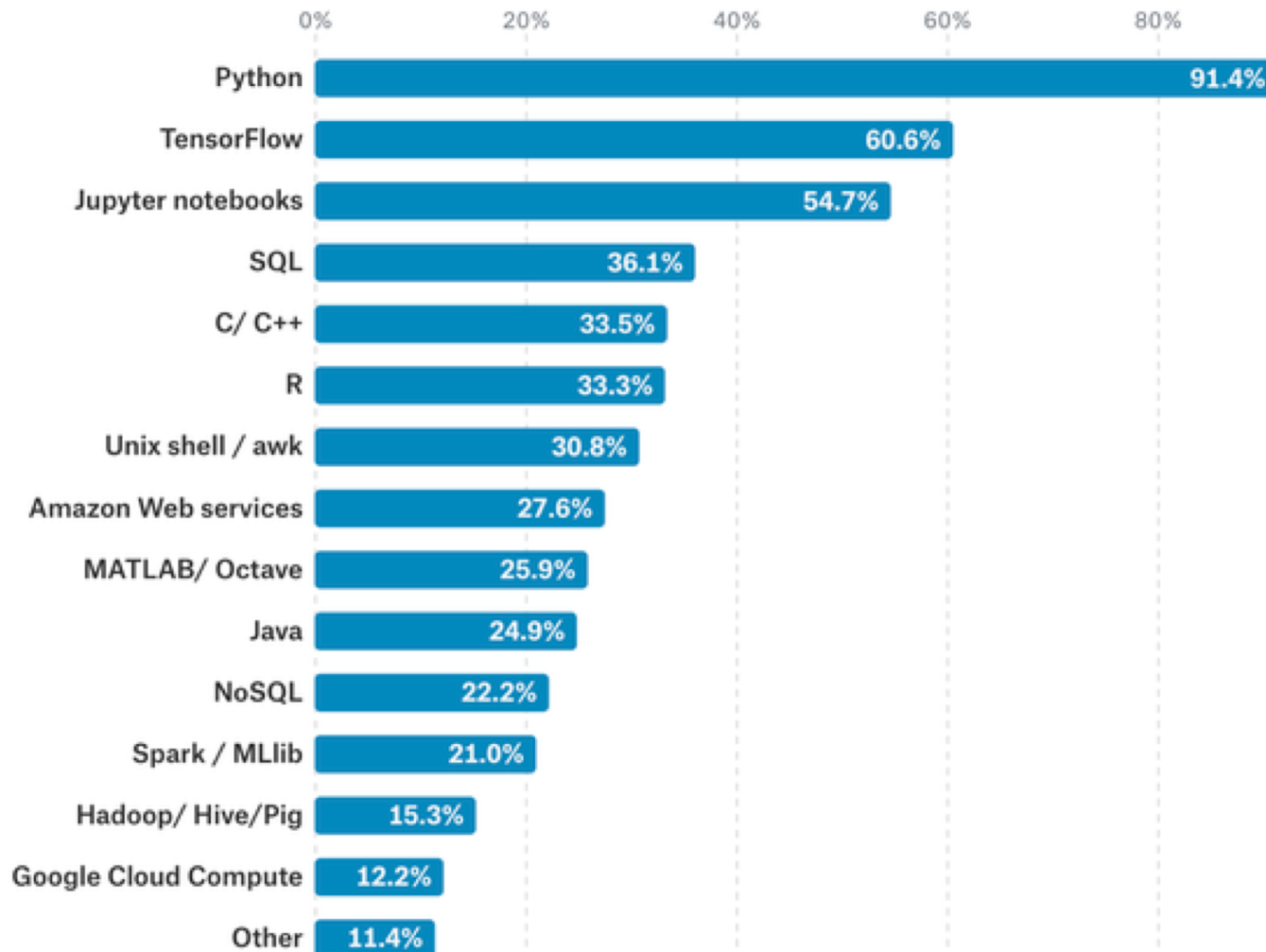
By acting like a capital-labor hybrid, Artificial Intelligence offers the ability to amplify and transcend the current capacity of capital and labor to propel economic growth. Our research reveals unprecedented opportunities for value creation.



# Programming Conv Vs Machine Learning



# Memilih Bahasa Pemrograman



# Memilih Framework

TensorFlow™

Install

Develop

Community

API ▾

Ecosystem ▾


Q

Search


GITHUB

An open source machine learning framework for everyone


GET STARTED



Get started with TensorFlow



TensorFlow 1.12 is here!  
TensorFlow 1.12 is available, see the



Announcing TensorFlow.js  
Learn about our JavaScript library for

# Mencari Dataset

The screenshot shows the homepage of the SATU DATA INDONESIA portal. At the top left is the logo, a red geometric shape with the text "SATU DATA INDONESIA". To the right is a navigation menu with links: DATA, VISUALISASI, APLIKASI, KOMUNITAS, TENTANG, and TOOLKIT. The main banner features a blue sky background with the text "DATA INDONESIA DALAM SATU PORTAL" in red. Below this is a search bar with the placeholder text "Cari Data, Tema, Instansi..." and a red search button with a magnifying glass icon. A red sidebar on the left contains a filmstrip icon. The central area has a red background with a pattern of white circles and contains ten icons representing different sectors: PANGAN (wheat), ENERGI (lightning bolt), INFRASTRUKTUR (gears), MARITIM (ship), KESEHATAN (heart with pulse), PENDIDIKAN (graduation cap), EKONOMI (Rp symbol), INDUSTRI (factory), PARIWISATA (suitcase), and REFORMASI BIROKRASI (building with people). Below this is a horizontal menu with tabs: Highlight, Peluncuran TONGGAK.id, Dataset, Organisasi, and Grup. The bottom section shows a preview of a dataset titled "Kanal dan Pelagi Museum Kita di Indonesia" with a map of Indonesia, and a sidebar on the right with the text "Dataset Terbaru" and "Group yang Paling Banyak Memiliki Dataset".

**SATU DATA INDONESIA**

DATA VISUALISASI APLIKASI KOMUNITAS TENTANG TOOLKIT

**DATA INDONESIA DALAM SATU PORTAL**

Cari Data, Tema, Instansi...

PANGAN ENERGI INFRASTRUKTUR MARITIM KESEHATAN

PENDIDIKAN EKONOMI INDUSTRI PARIWISATA REFORMASI BIROKRASI

Highlight Peluncuran TONGGAK.id Dataset Organisasi Grup

Kanal dan Pelagi Museum Kita di Indonesia

Dataset Terbaru


Group yang Paling Banyak Memiliki Dataset

# Mencari Dataset

**kaggle**  [Competitions](#) [Datasets](#) [Kernels](#) [Discussion](#) [Learn](#) [...](#)

Kaggle is the place to do data science projects

[See how it works](#)



**Register with just one click:**


We won't share anything without your permission

[Google](#) [Facebook](#) [Yahoo](#)


**Manually create an account:**

[Register](#)


**Start a new project**



**Explore projects created by others**

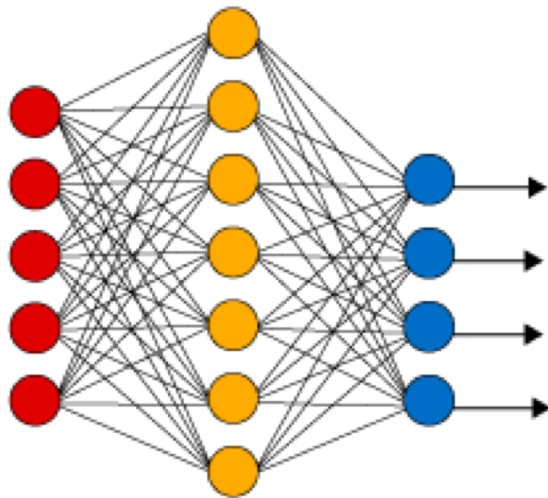


**Join one of our competitions**

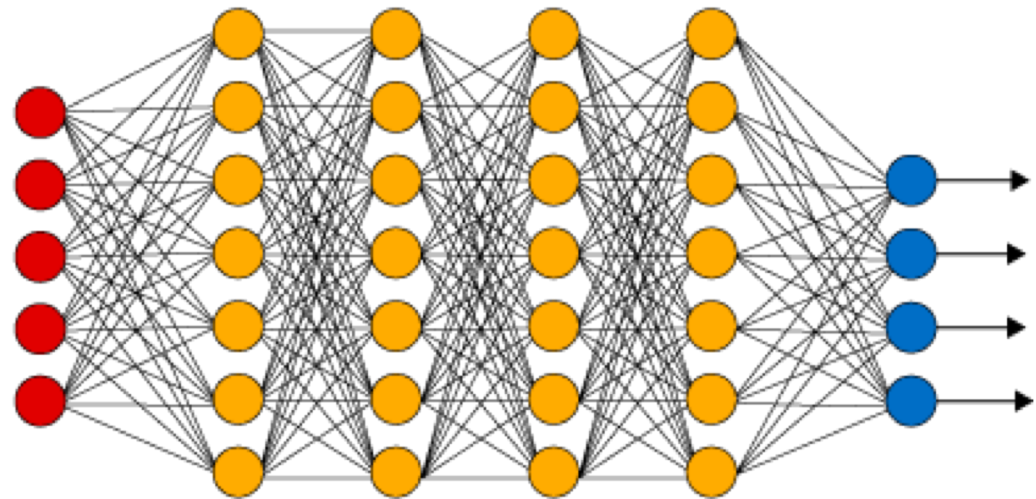


# Membuat Model

**Simple Neural Network**



**Deep Learning Neural Network**



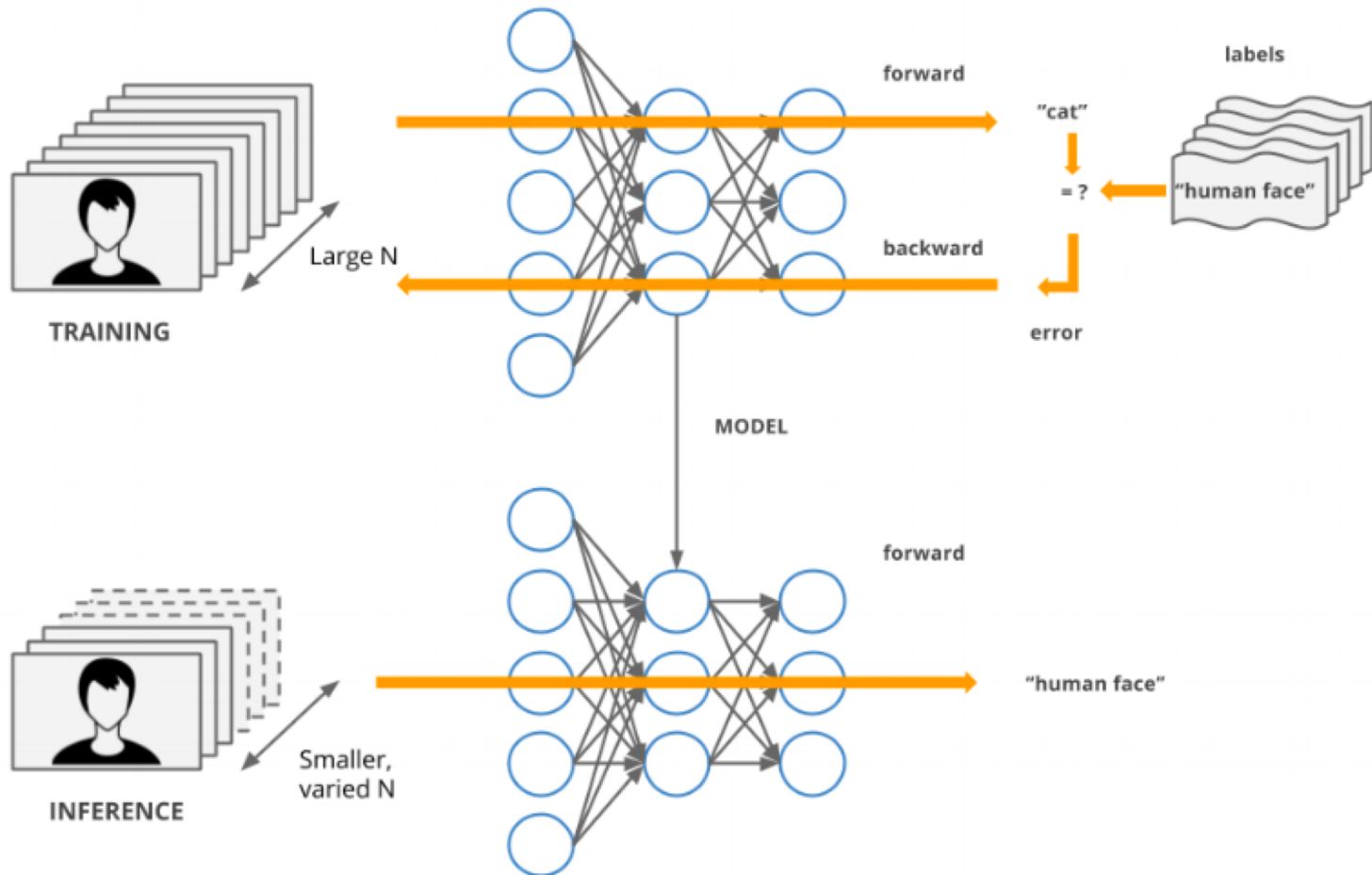
● Input Layer

● Hidden Layer

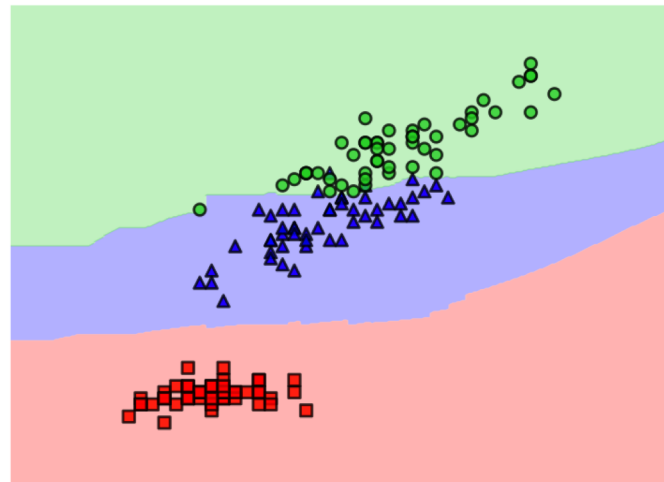
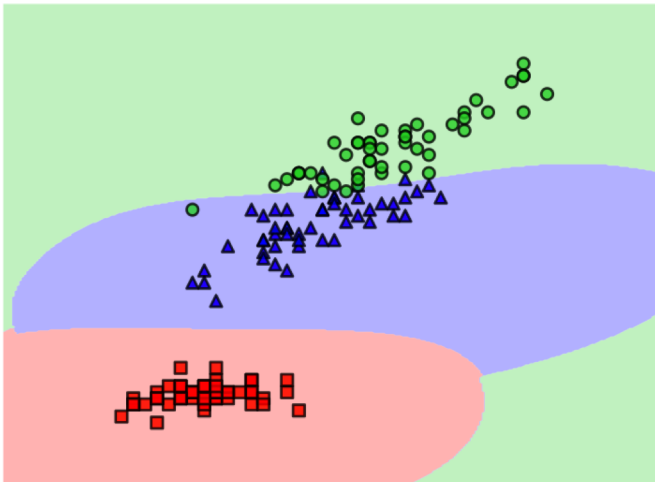
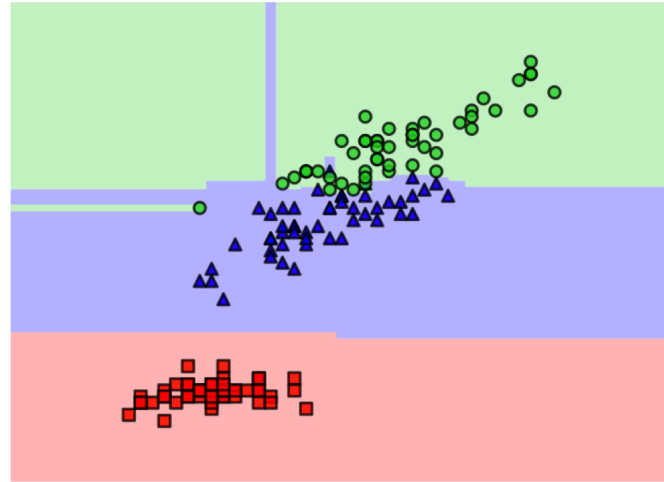
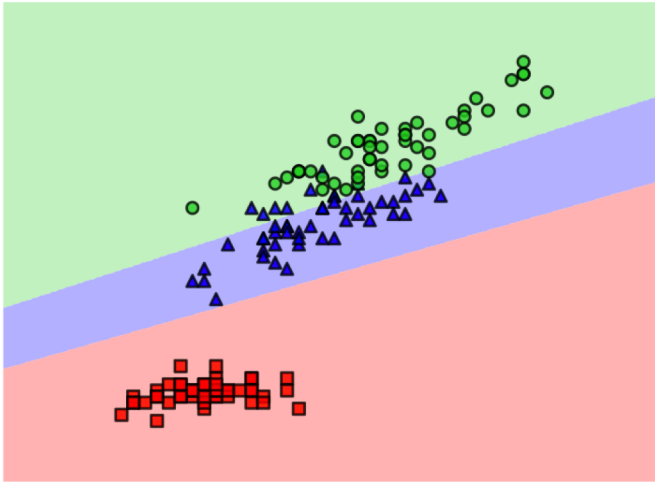
● Output Layer



# Training Model



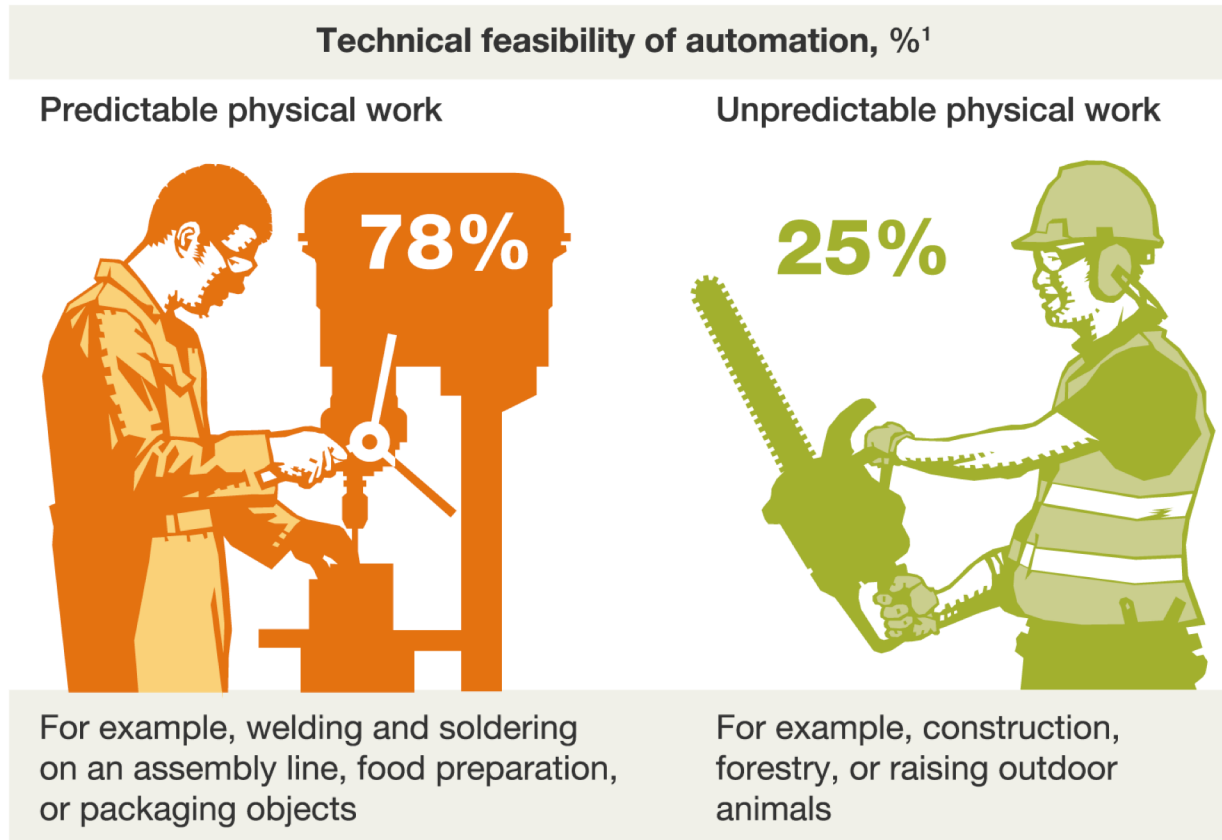
# Evaluasi



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Creative Commons Attribution 4.0 International License.

# Masa Depan AI

It's more technically feasible to automate predictable physical activities than unpredictable ones.



<sup>1</sup>% of time spent on activities that can be automated by adapting currently demonstrated technology.

# Masa Depan AI

## Example occupations

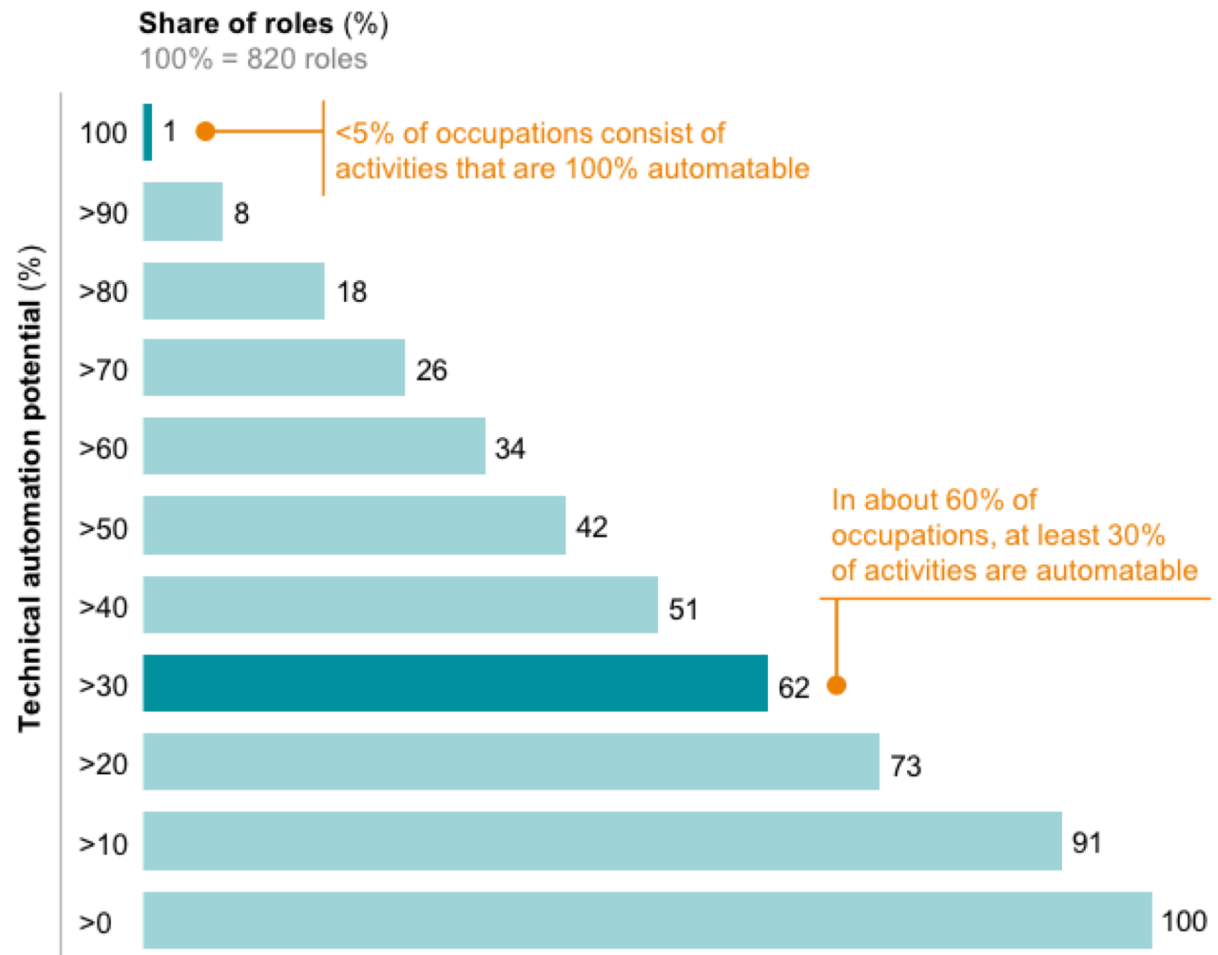
Sewing machine operators,  
graders and sorters of  
agricultural products

Stock clerks, travel agents,  
watch repairers

Chemical technicians,  
nursing assistants,  
Web developers

Fashion designers, chief  
executives, statisticians

Psychiatrists, legislators



# Masa Depan AI

Humans  
+  
Computers

>

Humans Alone

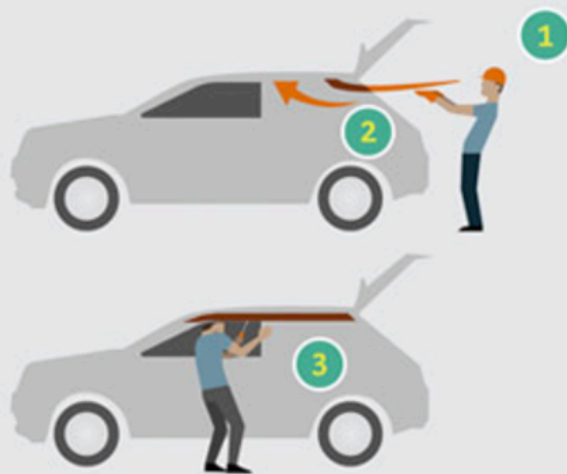
Computers Alone



# Masa Depan AI

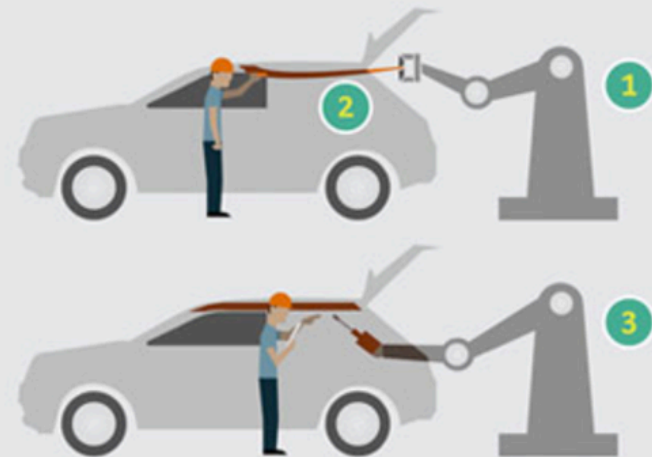
## EXHIBIT 4 | Automated Systems Can Assist Workers

LINE WORKER HAS A PHYSICALLY DEMANDING TASK



- 1 Worker lifts the roof lining into a car; the shape is difficult to handle
- 2 Worker manually aligns the roof lining and holds it in place
- 3 Worker fastens the roof lining with screws, which requires being in an uncomfortable position

ROBOT PROVIDES ERGONOMIC IMPROVEMENTS

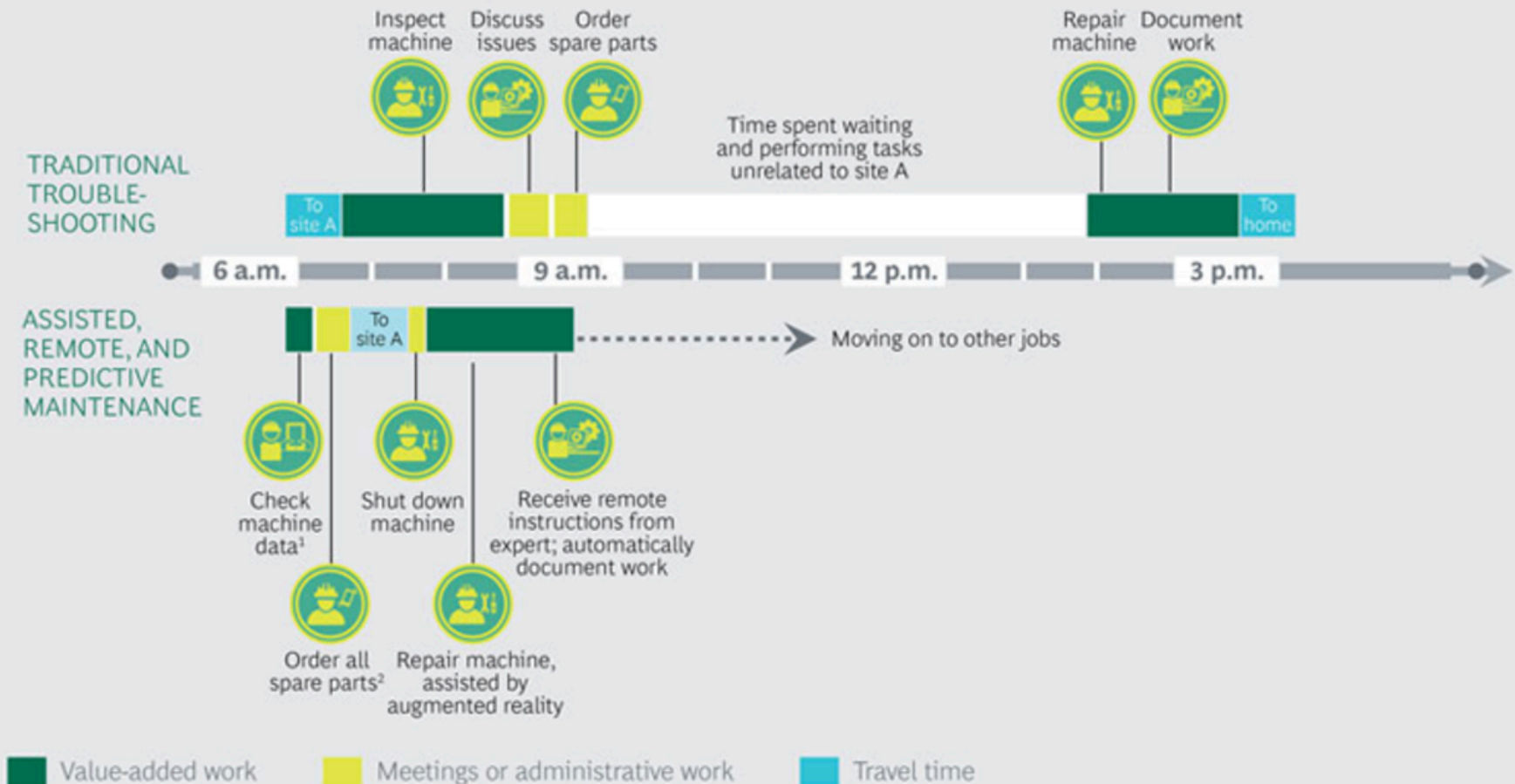


- 1 Robot lifts the roof lining and places it in the chassis
- 2 Worker guides the robot in aligning the roof lining but carries no weight
- 3 Robot fastens the lining with screws as directed by worker, who maintains a comfortable position

Sources: Expert interviews; BCG analysis.

# Masa Depan AI

## EXHIBIT 5 | Technology Transforms a Service Technician's Daily Work



Sources: Expert interviews; BCG analysis.

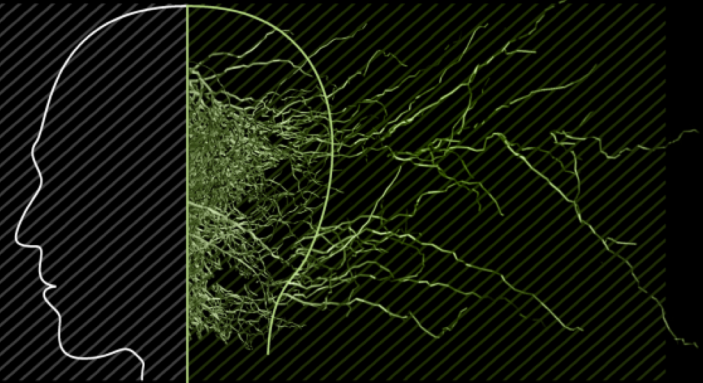
<sup>1</sup>Review real-time data from machines' sensors for abnormalities.

<sup>2</sup>Order spare parts for all machines with abnormalities or damaged parts.



# Masa Depan AI

## COMPETITIVE ADVANTAGE THAT LEVERAGES MAN AND MACHINE



Future Sources of  
Competitive Advantage

### MAN

### MACHINE

Privileged Zones

**ACT WHERE OTHERS CAN'T**

- › Talented workforce
- › Business ecosystems

- › Data access
- › Data and tech ecosystems

Learning & Execution

**MERGE EXPLOITATION AND EXPLORATION**

- › Agile forms of working

- › Machine learning

Flexibility

**EMBRACE CONTINUOUS CHANGE**

- › Adaptive organizations
- › AI-driven job adaptation and training

- › Scalable central systems
- › Decentralized agents



# Masa Depan AI

## FOUR LENSES TO SHAPE ADVANTAGE FROM AI

### CUSTOMER NEEDS



- › Explicit or implicit unmet needs
- › Customer journeys

### TECHNOLOGICAL ADVANCES



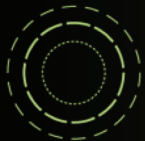
- › Sensing and input
- › Platforms and tools
- › Agents and output

### DATA SOURCES



- › Internal
- › External
- › New investments

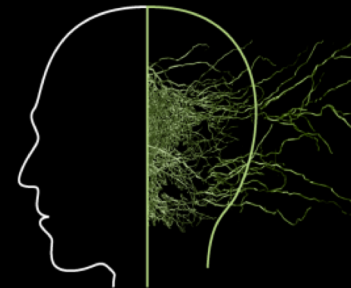
### DECOMPOSITION OF PROCESSES



- › Exposure of “routine” and isolated activities

### EVALUATION CRITERIA:

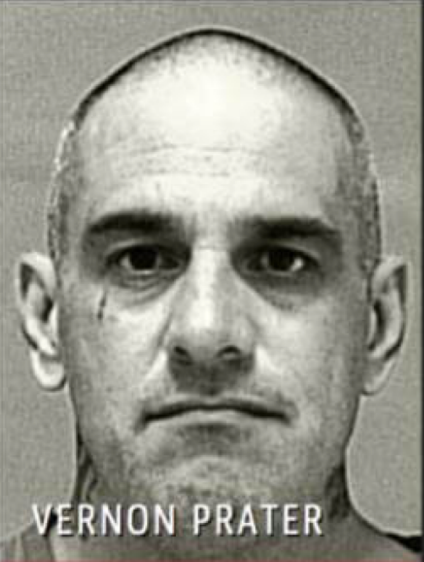

- › Richness of data
- › Scale and speed
- › Opportunity for systemic learning



ADVANTAGE  
FROM AI

# Masa Depan AI

Two Petty Theft Arrests

	
VERNON PRATER	BRISHA BORDEN
LOW RISK 3	HIGH RISK 8

*Borden was rated high risk for future crime after she and a friend took a kid's bike and scooter that were sitting outside. She did not reoffend.*

Masalah Etikal pada AI akan menjadi bahan kajian yang serius

Terima Kasih