

# Introduction to Artificial Intelligence

# Objectives

- Introduction
- Define artificial Intelligence
- Explain Turing Test

# About Me

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*B.Comp.Sc.(Hons) in Artificial Intelligence (UM)*

# Google Classroom

Kindly Check your email and Accept the Invitation to  
join the Google Classroom

# Google Classroom

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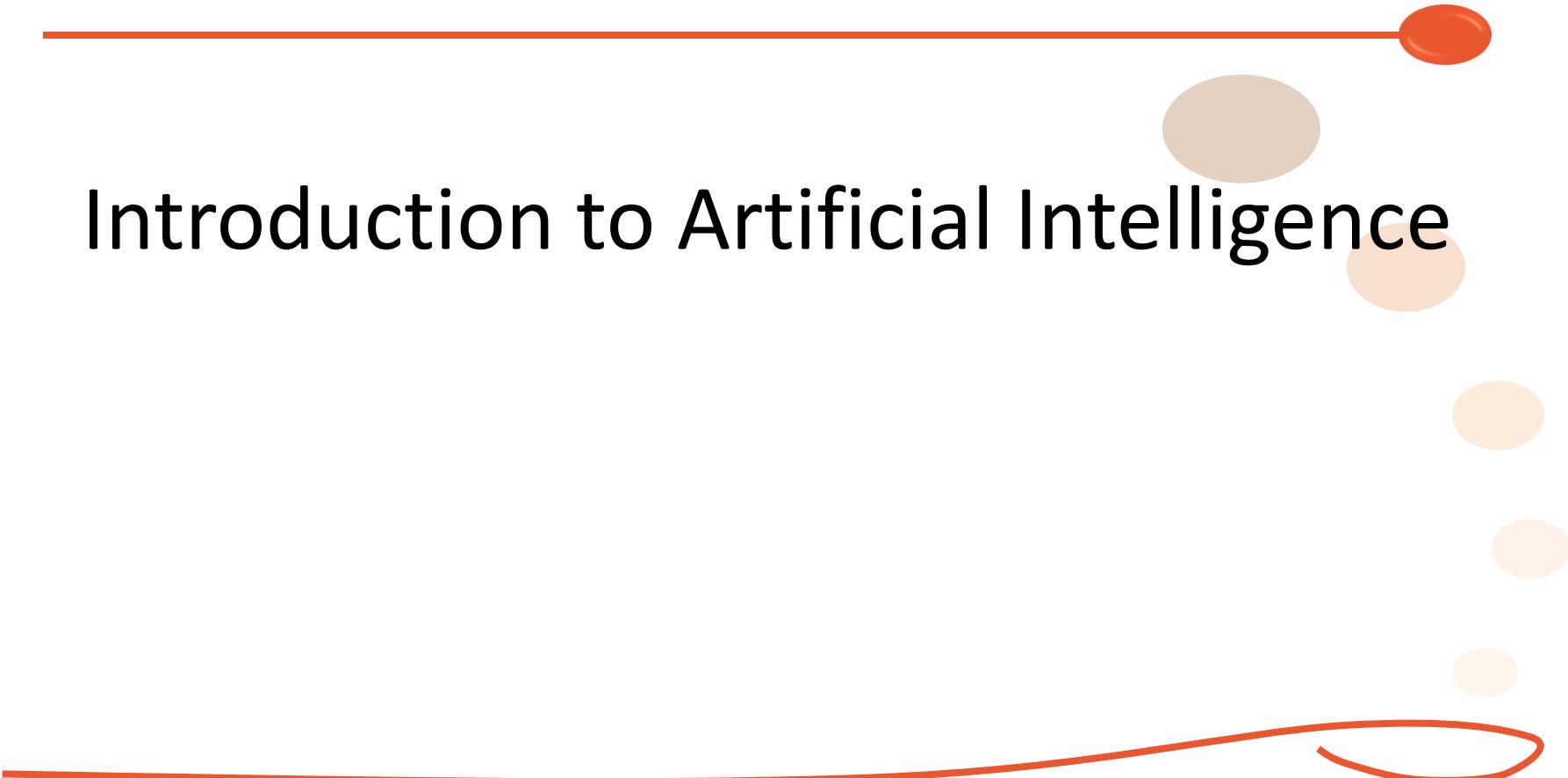


Google Classroom

# Course Plan

Assessment	Deadline	Contribution
<b>Coursework</b>		<b>60 %</b>
Assignment	Prototype: Week 13 Monday Document: Week 13 Friday	24 marks 36 marks
Test	Week 8	40 marks
<b>Final Exam</b>	4 questions (E-assessment)	<b>40%</b>

# Introduction to Artificial Intelligence



# first generation of AI researchers



The IBM 702 in 1953: a computer used by the first generation of AI researchers

# Evolution of Machines



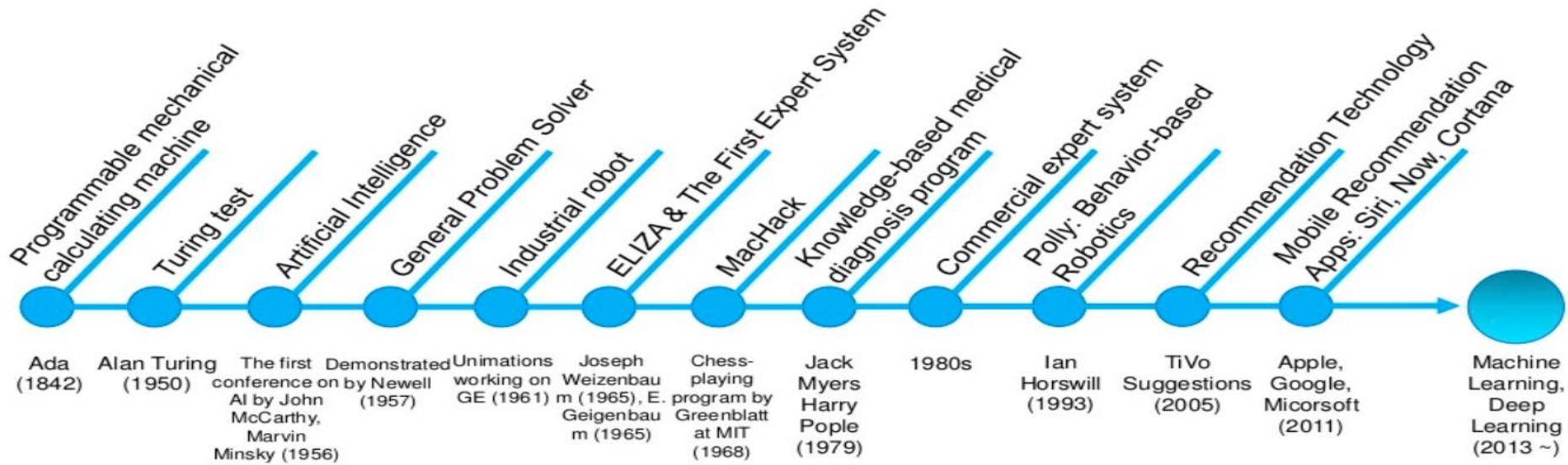
RM4,827,650

RM 12,626

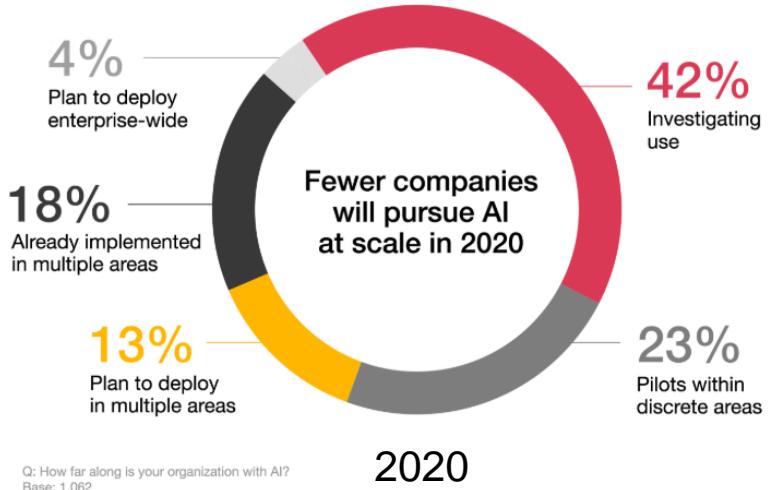
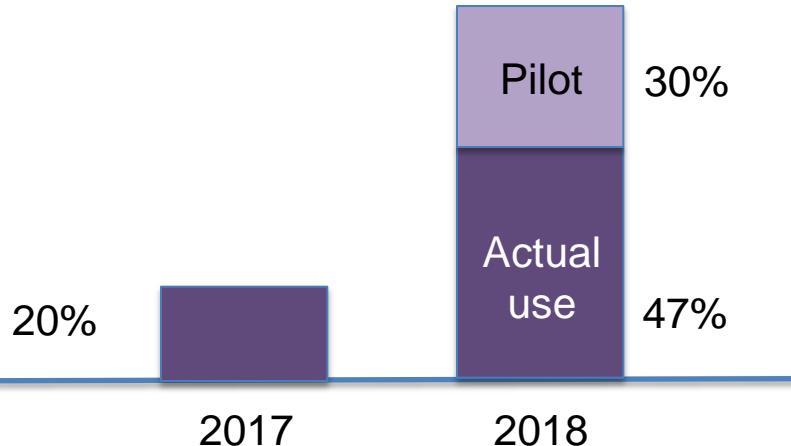
RM3,699

Equivalent price in 2020

# AI Timeline



Source: <https://www.slideshare.net/kepark07/ai-history-to-machine-learning/4>



How far along organizations are in implementing AI for 2020

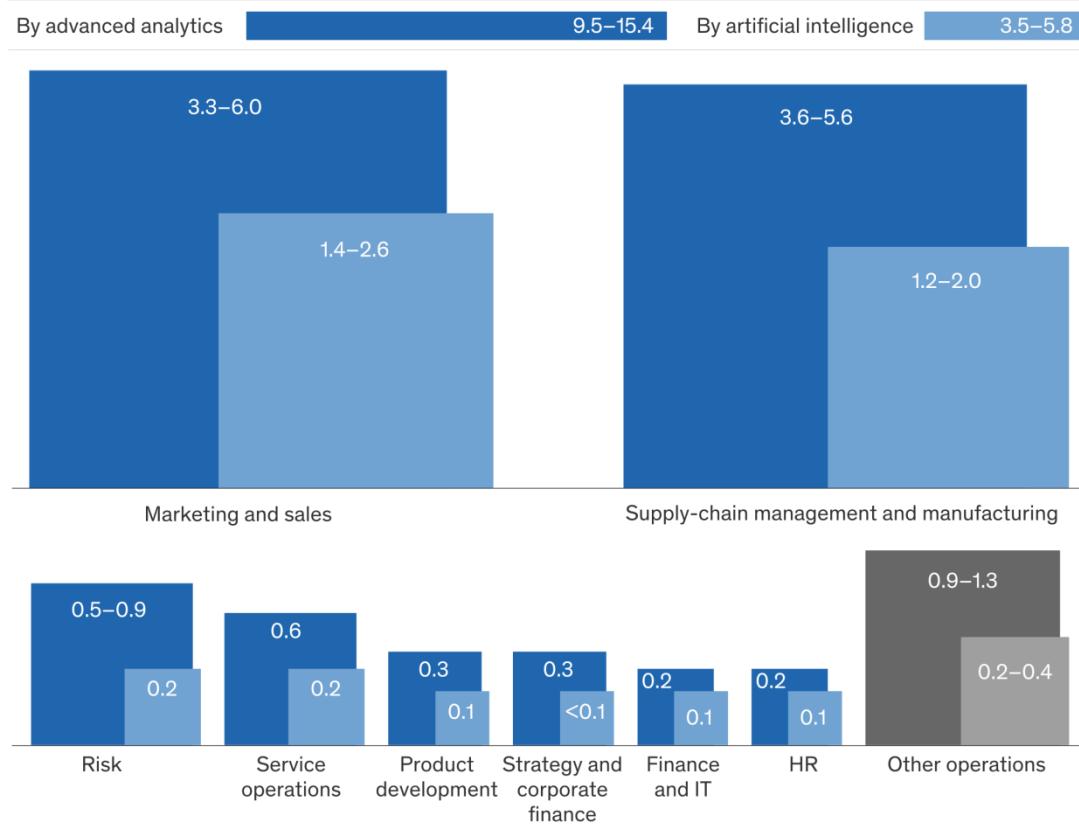
Image: PwC

## Adoption of at least one AI technology

- <https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/how-to-make-ai-work-for-your-business>
- <https://www.mckinsey.com/featured-insights/artificial-intelligence/ai-adoption-advances-but-foundational-barriers-remain>
- *study of AI that included a survey of >3000 executives, across 14 sectors and ten countries*

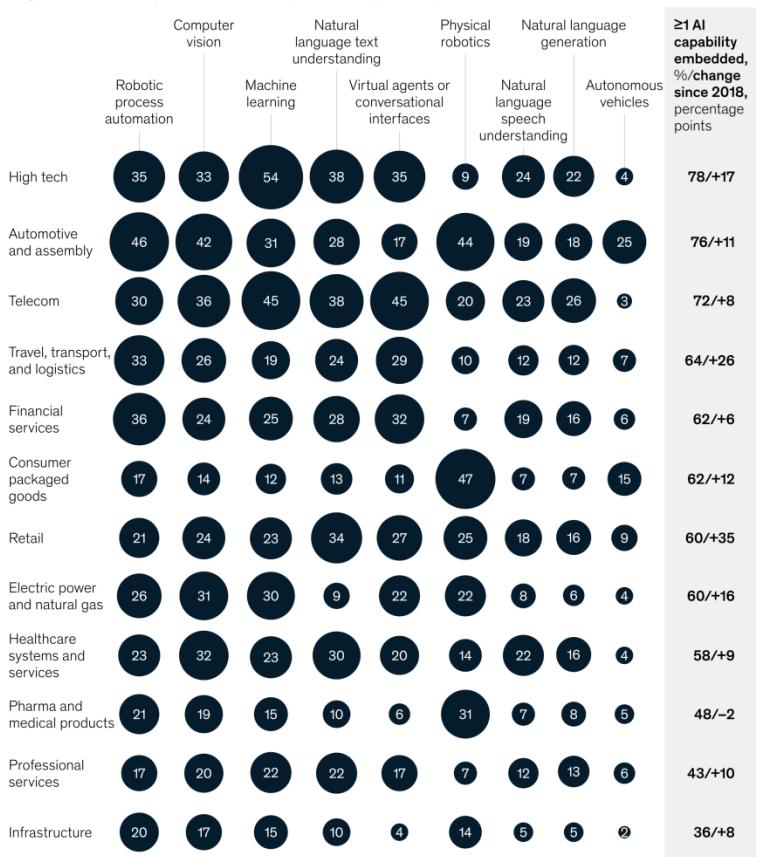
**Artificial intelligence's impact is likely to be most substantial in marketing and sales as well as supply-chain management and manufacturing, based on our use cases.**

**Value unlocked, \$ trillion**



High tech leads in AI adoption, and industries are generally using the AI capabilities most relevant to their value chains.

Organizations' AI capabilities,<sup>1</sup> % of respondents,<sup>2</sup> by industry

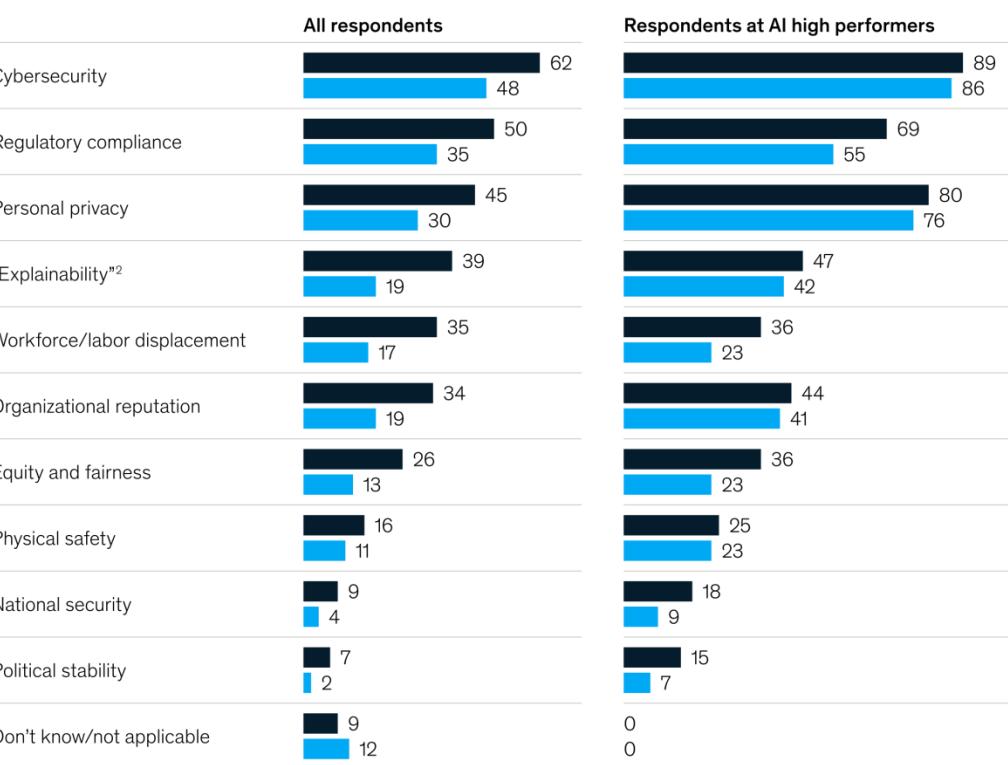


<sup>1</sup>Embedded in ≥1 product and/or business process for ≥1 function or business unit.

<sup>2</sup>Respondents who said "don't know" or "none of the above" are not shown. For high tech, n = 277; for automotive and assembly, n = 128; for telecom, n = 93; for travel, transport, and logistics, n = 83; for financial services, n = 396; for consumer packaged goods, n = 72; for retail, n = 94; for electric power and natural gas, n = 82; for healthcare systems and services, n = 78; for pharma and medical products, n = 96; for professional services, n = 331; and for infrastructure, n = 91.

Respondents at AI high performers are more likely than average to say their companies identify AI-related risks—and work to mitigate them.

Risks that organizations consider relevant and are working to mitigate,  
% of respondents<sup>1</sup>

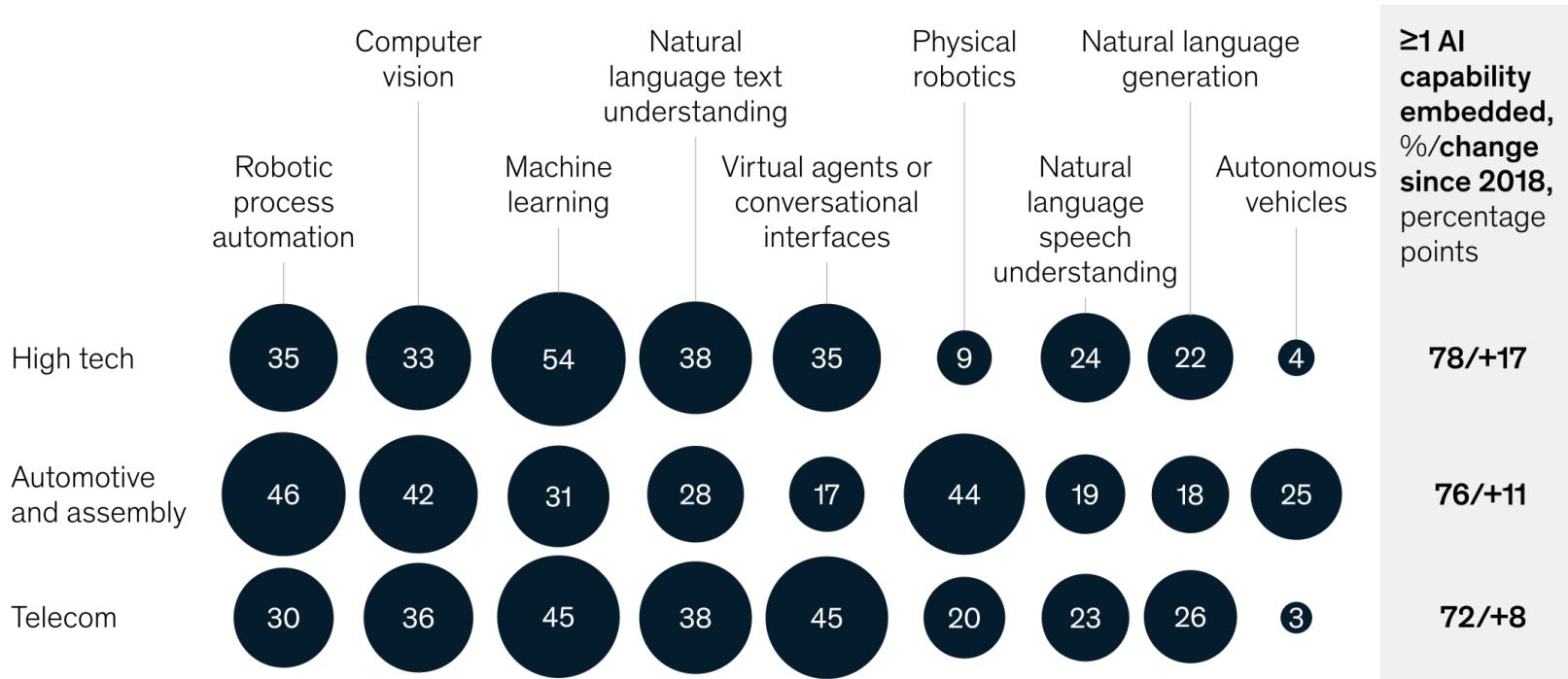


<sup>1</sup>Question asked only of respondents who said their companies had embedded or piloted ≥1 AI capability; n = 1,872.

<sup>2</sup>Ability to explain how AI models come to their decisions.

# Adoption of AI Capabilities by Top 3 Industries

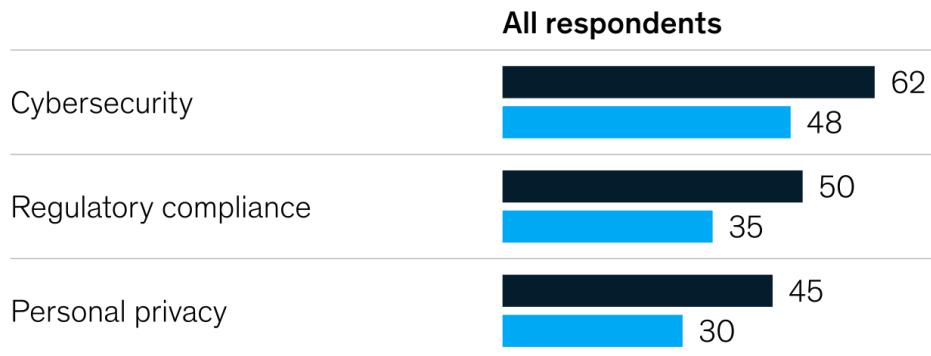
Organizations' AI capabilities,<sup>1</sup> % of respondents,<sup>2</sup> by industry



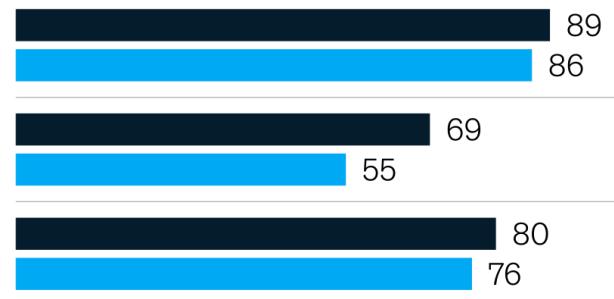
# The Top 3 Risks that Organizations Consider Them Relevant

Despite extensive dialogue across industries about the potential risks of AI and highly publicized incidents of privacy violations, unintended bias, and other negative outcomes, the survey findings suggest that a minority (41%) of companies recognize many of the risks of AI use. Even fewer are taking action to protect against the risks.

**Risks that organizations consider relevant and are working to mitigate,  
% of respondents<sup>1</sup>**



**Respondents at AI high performers**



## Top-five AI capabilities company will cultivate



Q: Which of the following AI capabilities will be most important to your organization in 2020. Rank 1-3

Bases: 1,062

Source: PwC 2020 AI Predictions Survey

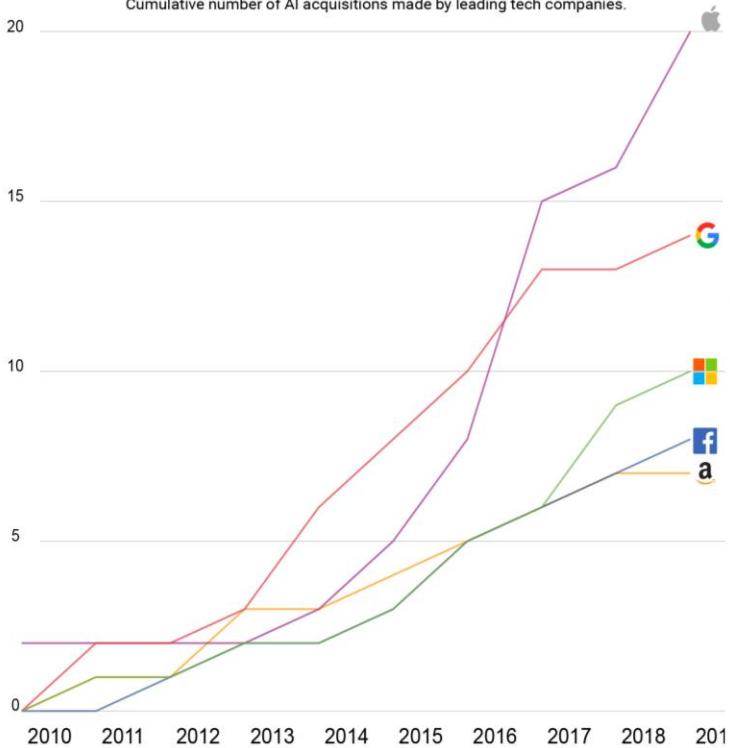
Rank of the importance of AI capabilities for organisations in 2020

Image: PwC

# Tech Giants in AI development

## THE RACE FOR AI

Cumulative number of AI acquisitions made by leading tech companies.

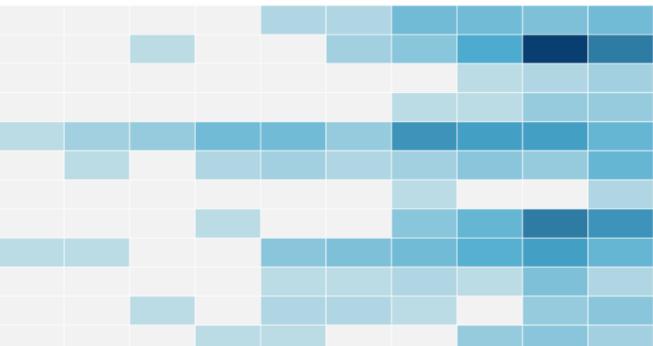


## HEATMAP: CONCENTRATION OF AI ACQUISITIONS BY CATEGORY (2011-2019 YTD)

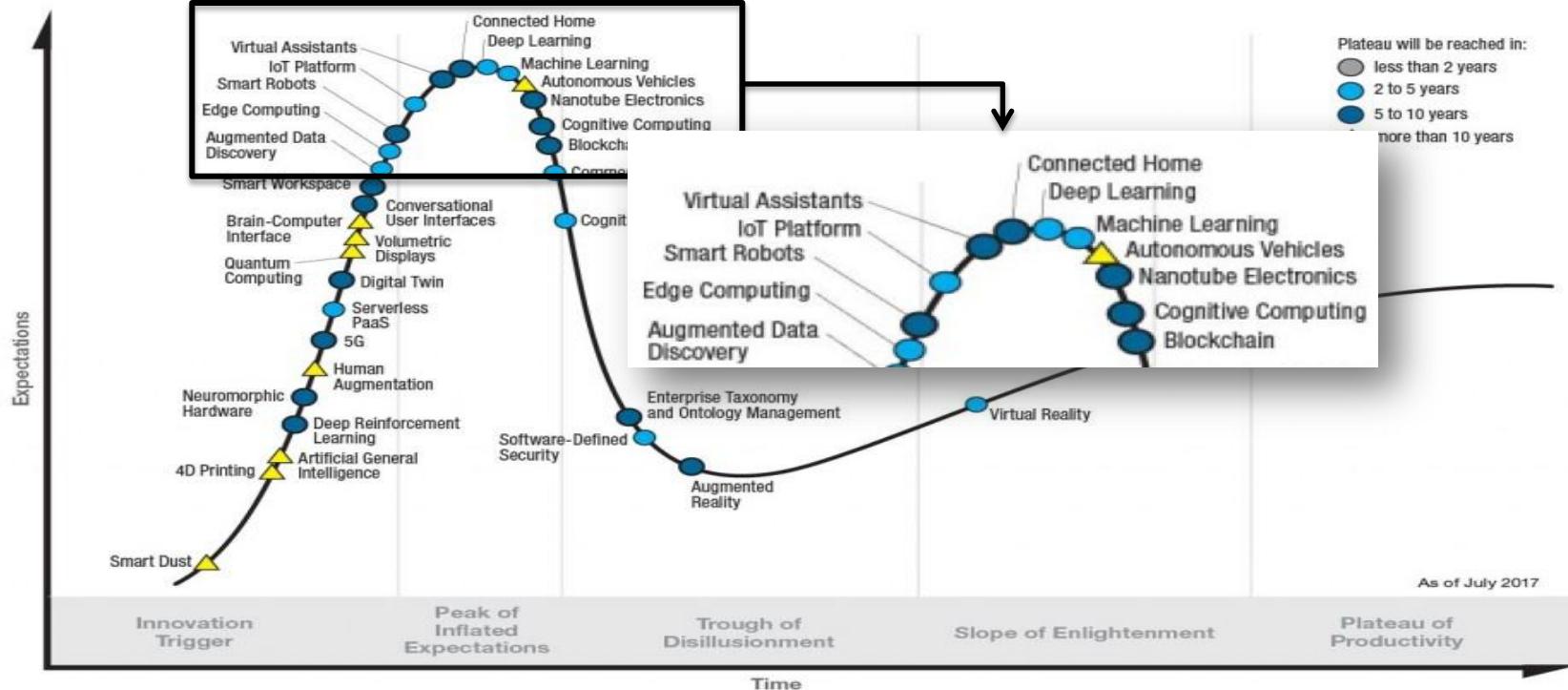


### Applications

- Data Management & Analytics
- Cybersecurity
- Software Development
- IT & Devops
- Speech, NLP(G), Computer Vision
- BI & Operational Intelligence
- Process Automation
- Sales & CRM
- Ad & Marketing
- Productivity & Project Mgmt.
- HR Tech
- Other Research & Consultancies



# Gartner Hype Cycle for Emerging Technologies, 2017



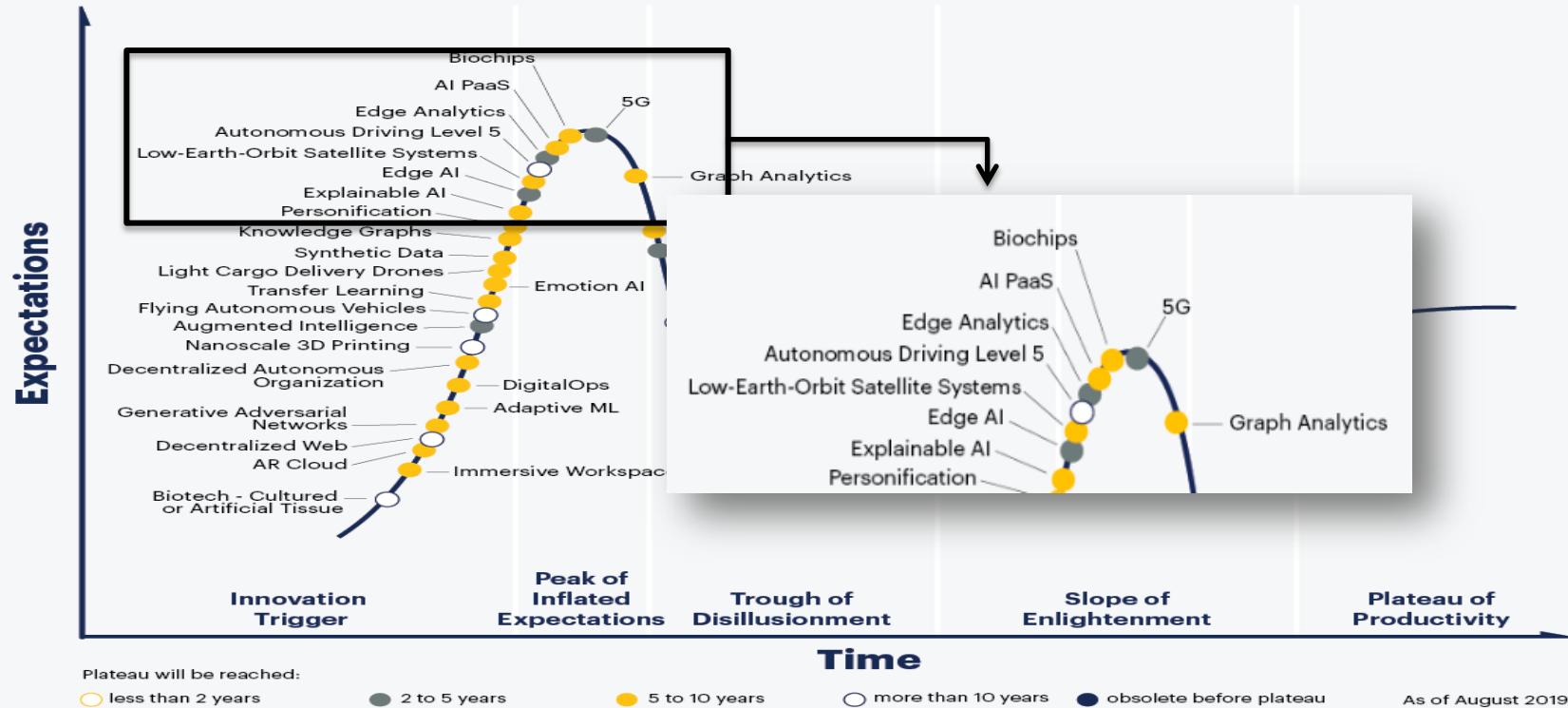
[gartner.com/SmarterWithGartner](http://gartner.com/SmarterWithGartner)

Source: Gartner (July 2017)

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**Gartner**

# Gartner Hype Cycle for Emerging Technologies, 2019



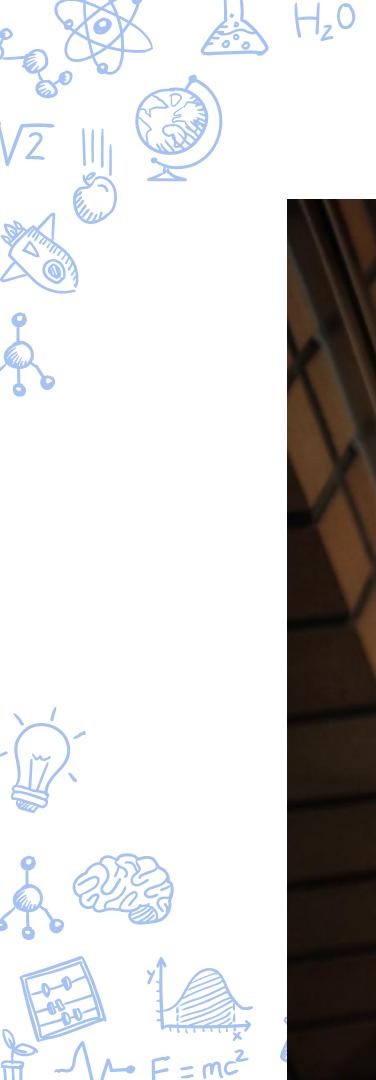
[gartner.com/SmarterWithGartner](http://gartner.com/SmarterWithGartner)

Source: Gartner  
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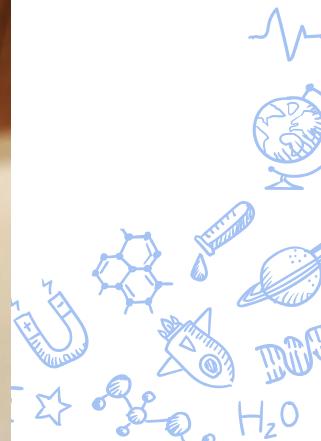
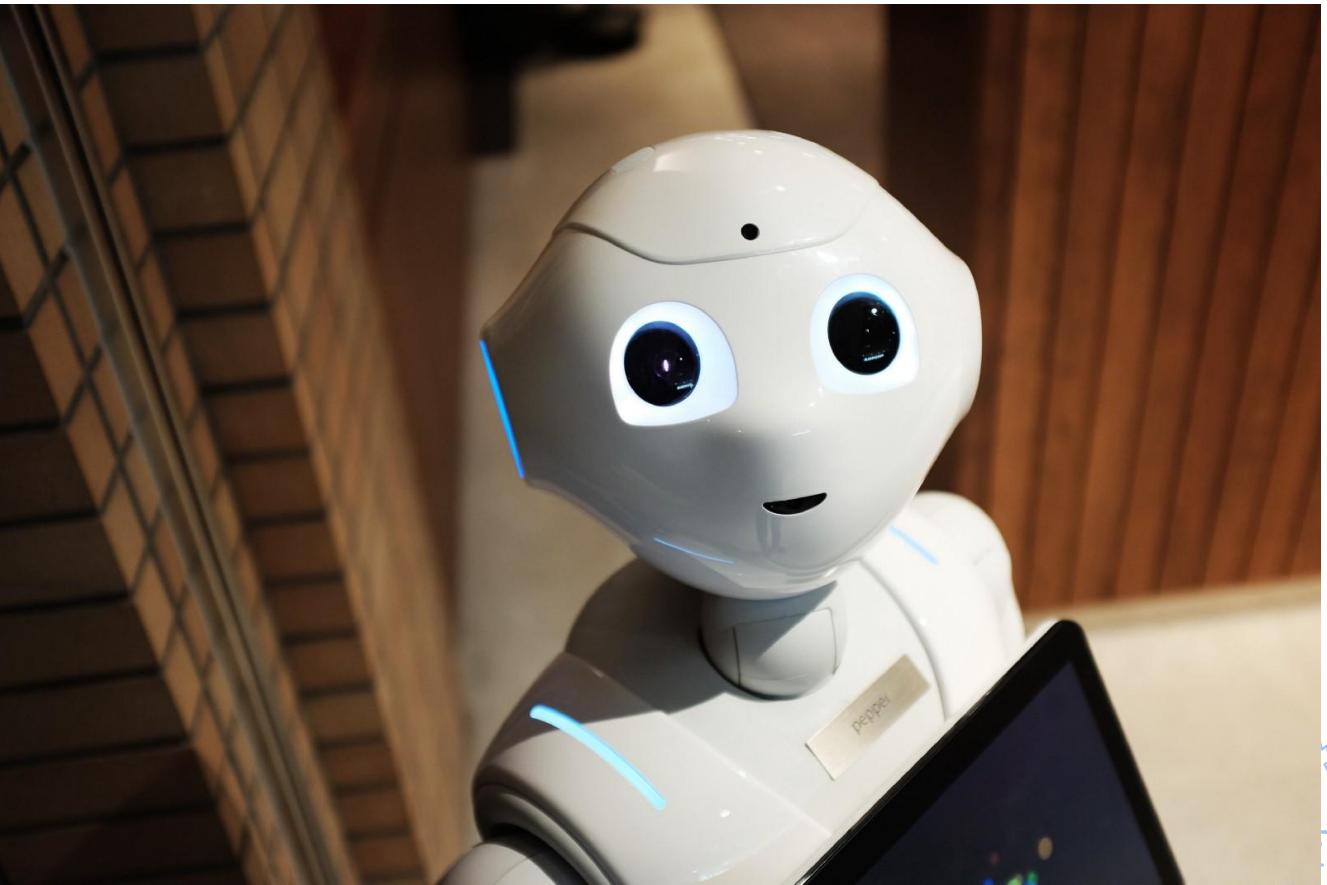
**Gartner**

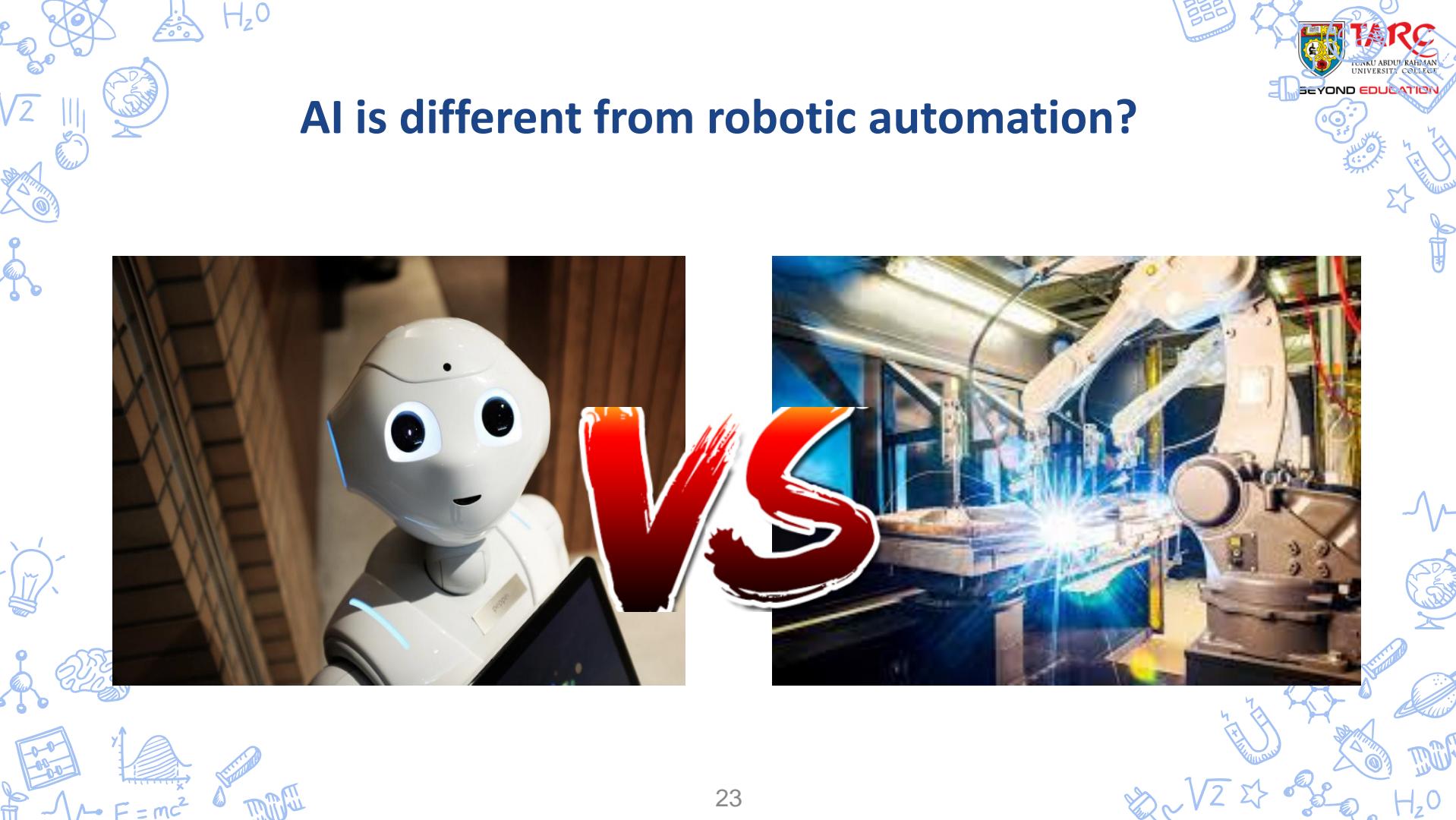
# Definition of Artificial Intelligence

# Questions for your THOUGHT



# Is this Artificial Intelligence?





# Question

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- How would you define Artificial Intelligence?

## Artificial Intelligence

**Artifice:** clever or cunning devices or expedients, especially as used to trick or deceive others.

+

**Intelligence:** ?

"making a machine to  
behave in ways that would be  
called intelligent if a human  
were so behaving."

***John McCarthy***

*at the Dartmouth Conference in 1956*

## Systems that act like human

- Automation
- Chatbot

## Systems that think like human

- Machine learning
- Recommender

# Artificial Intelligence

## Systems that act rationally

- Adaptive Systems
- Planning & Optimisation

## Systems that think rationally

- Expert system

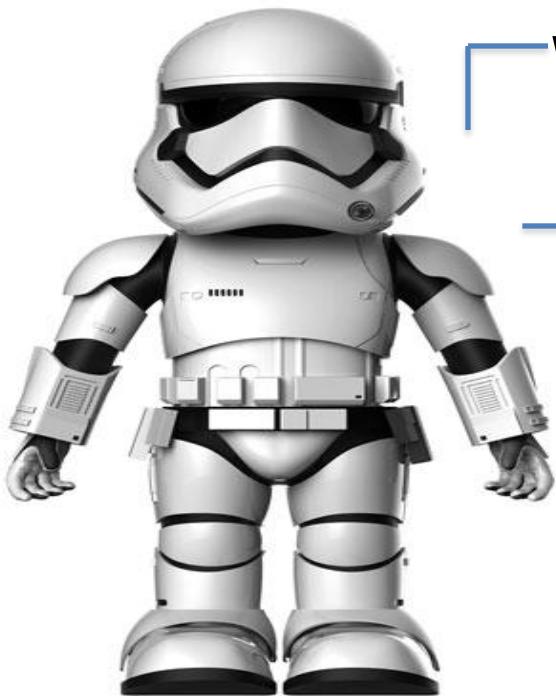


Prof S.J. Russell,  
University of  
California, Berkeley



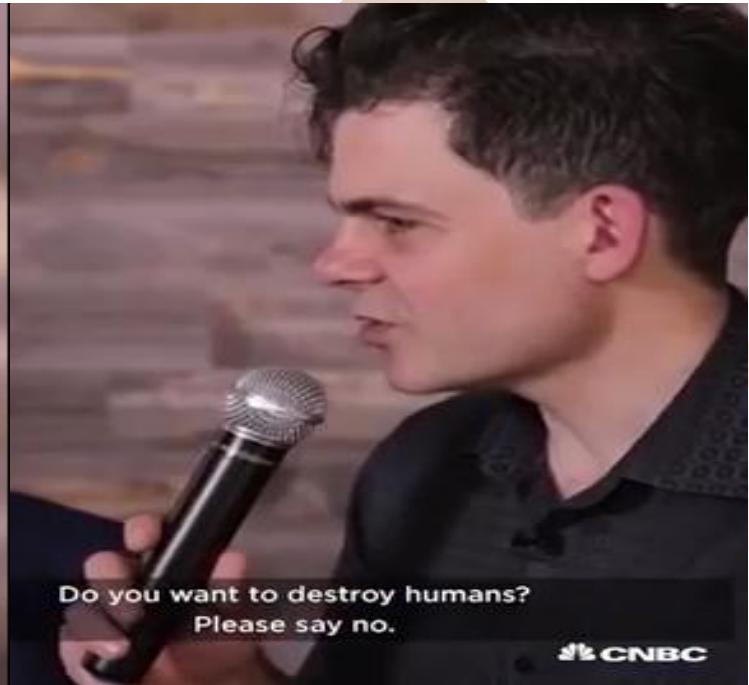
Peter Norvig,  
Director of Research  
at Google, Inc.

# Machine that Acts like a Human



- With human characteristics
- Reflects human condition

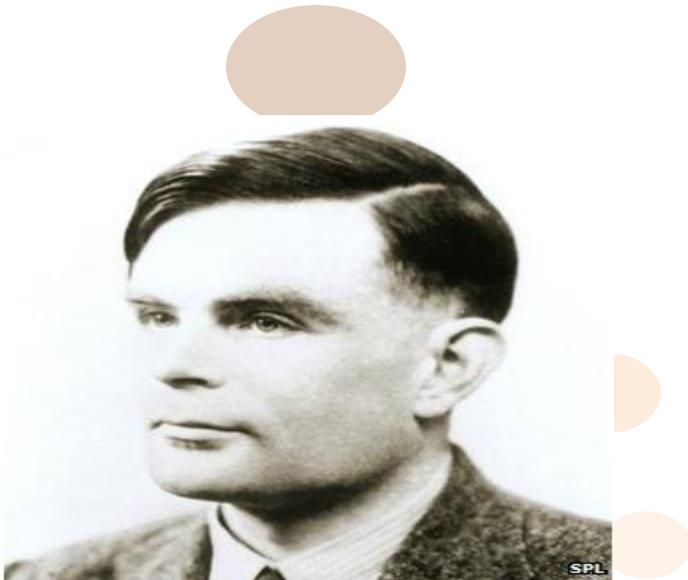
# Humanoid Robot: Sophia



# Turing Test Approach

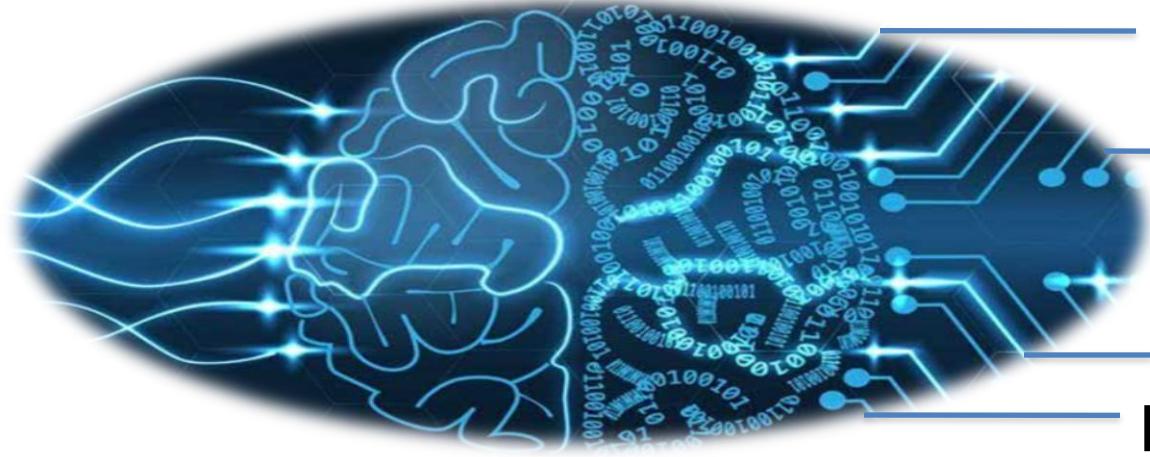
*Can machines think?*

Alan Turing (1950), “Computing Machinery and Intelligence”



The Male–Female Imitation Game

# Machine that thinks like a human



Self-learning

Pattern  
recognition  
Natural language  
processing  
Neural network

Designed to solve problems by thinking,  
reasoning, and remembering, to mimic the way  
the human brain works

# Thinking Humanly - Cognitive Modeling approach

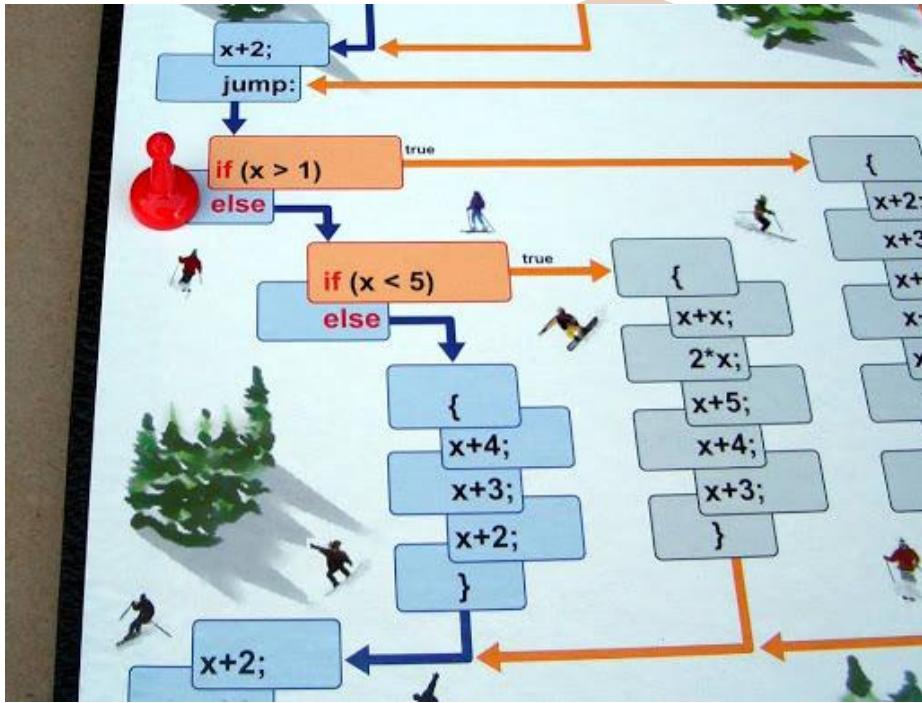
- A study on how computer models could be used to address the psychology of memory, language, and logical thinking.
- If the program's input-output behaviour matches corresponding human behaviour, that is evidence that some of the program's mechanisms could also be operating in humans.
- The interdisciplinary field of cognitive science brings together computer models from AI and **experimental** techniques from psychology to construct theories of human mind.

# Machine that Thinks Rationally

## Logic

# Rule-based System

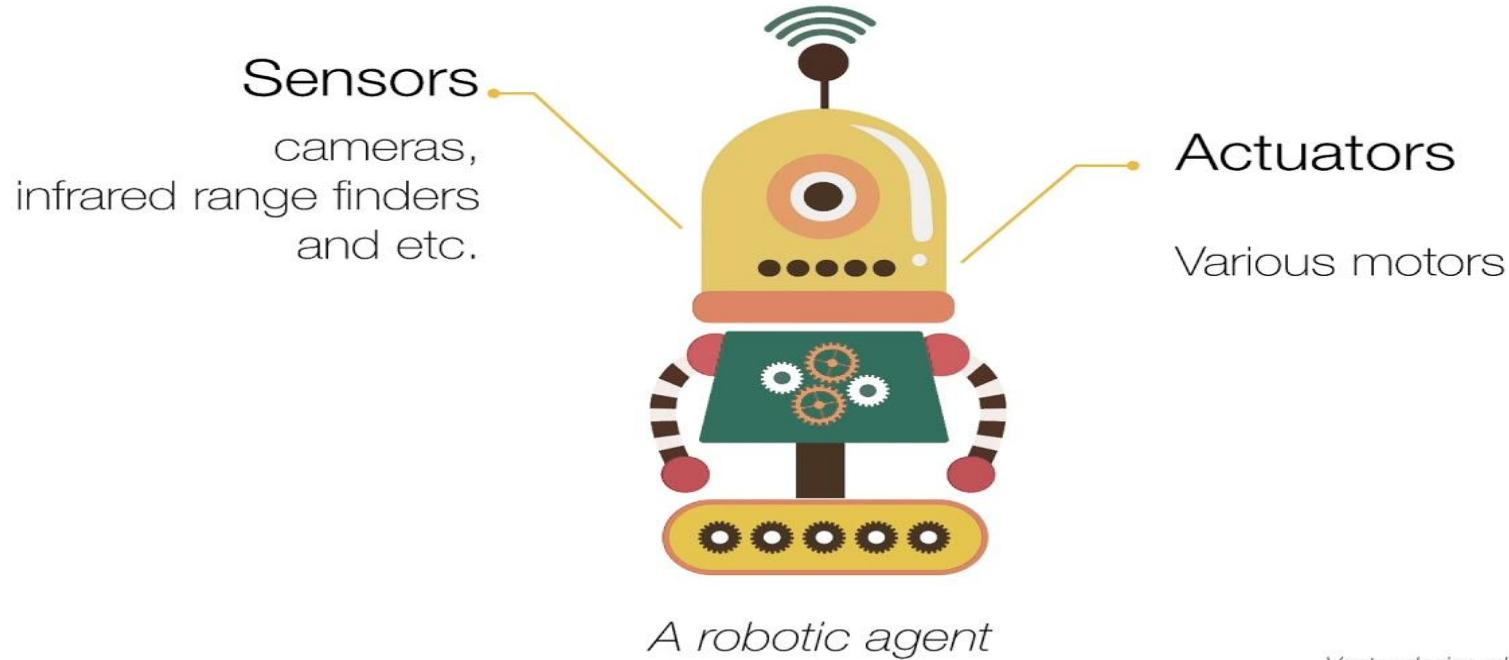
# Example: Expert System



# Thinking Rationally – Logic approach

- This is about how to codify “rational thinking”.
- Rational thinking = Logic
- Logic uses a process of inference to derive new representations about the world, and use these new representations to deduce what to do.
- Example: \_\_\_\_\_

# Machine that Acts Rationally



Vector designed by [freepik.com](http://freepik.com)

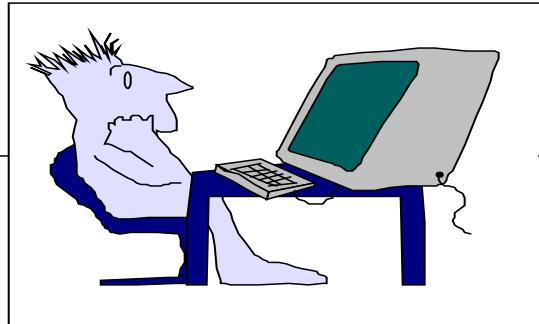
# Acting Rationally – the **Agent** approach

- Agent is something that **acts** autonomously, sensitive (**sense**) to its environment, **adapt** to change, and create/pursue **goals**.
- Rational act may involve rational thinking
- But if there is no provably correct thing to do (the thinking may not be rational), the best expected outcome must still be done.
- Example: \_\_\_\_\_

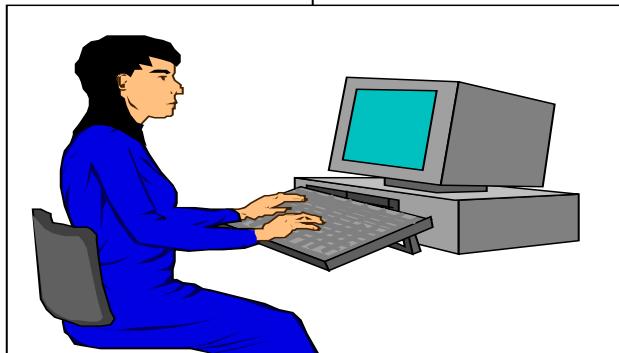
# Turing Test

- A.k.a. ***Turing Imitation Game***.
- The imitation game originally included two phases.

# Turing Imitation Game: Phase 1



to work out who is the man and who is the woman



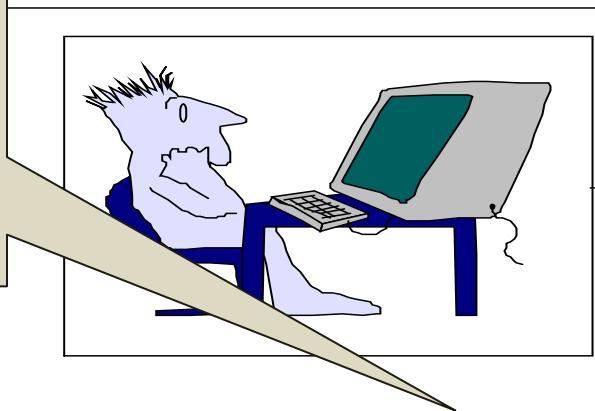
to convince the interrogator that she is the woman.



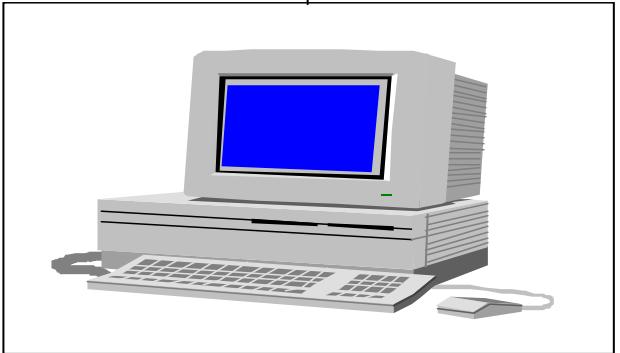
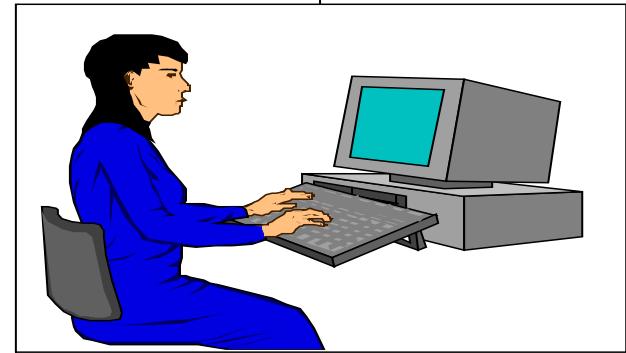
To deceive the interrogator that he is the woman

# Turing Imitation Game: Phase 2

the man is replaced by a computer programmed to deceive the interrogator as the man did.



It would even be programmed to make mistakes and provide fuzzy answers in the way a human would.

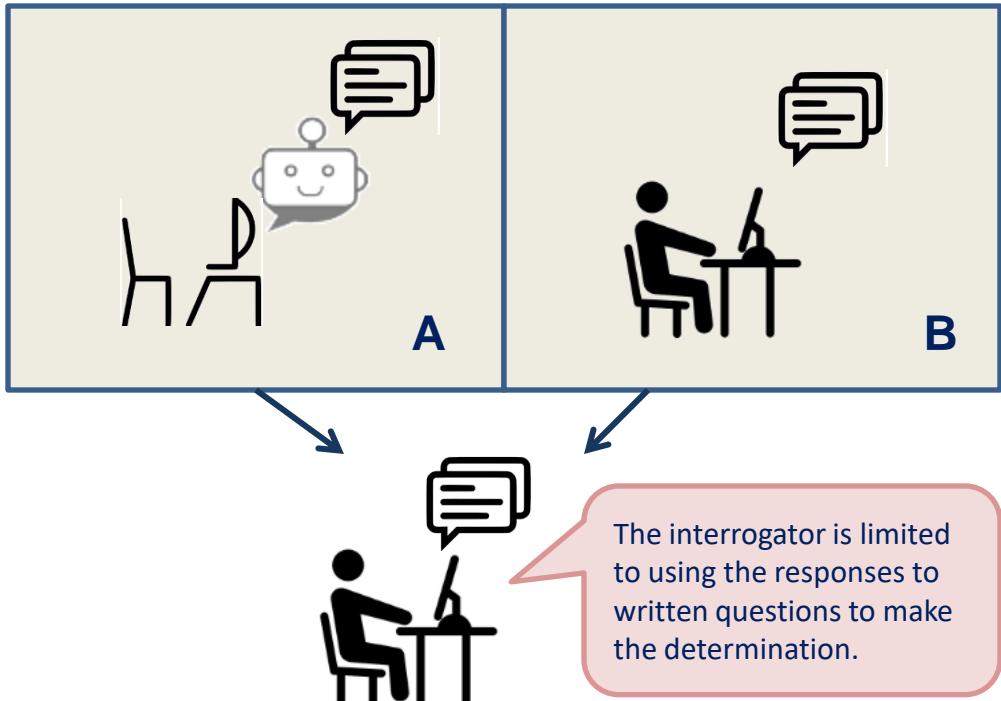


# Turing Test

The "standard interpretation" of the Turing test:

An interrogator, who is a human, is given the task of trying to determine which player – A or B – is a computer and which is a human.

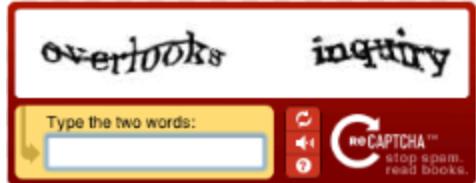
If the machine is able to deceive the interrogator, then the machine passes the Turing test and it is considered to be intelligent.



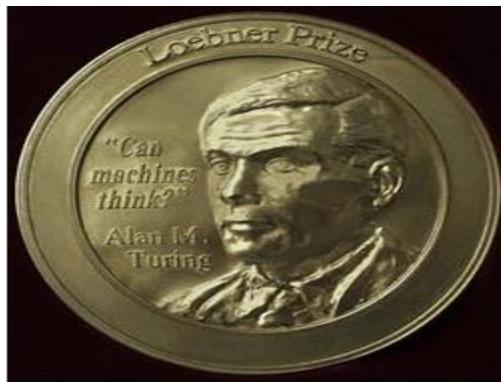
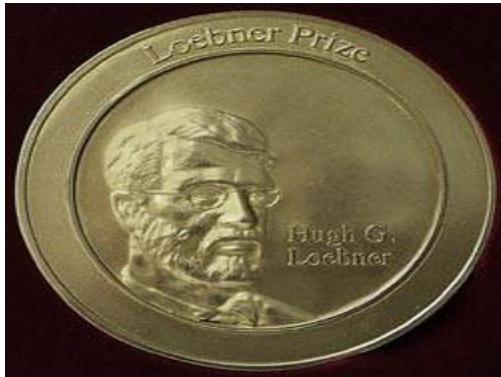
# Turing Test Application

## CAPTCHA

- to prevent automated systems from being used to abuse the site
- If any software is able to read the distorted image accurately, so any system able to do so is likely to be a human.



# Loebner Prize for Turing Test



- The Loebner Prize is the first formal instantiation of a Turing Test.
- In 1990 Hugh Loebner agreed with The Cambridge Center for Behavioral Studies to underwrite a contest designed to implement the Turing Test.
- Dr. Loebner pledged a Grand Prize of \$100,000 and a Gold Medal for the first computer whose responses were indistinguishable from a human's.

# Mitsuku (Kuki) –

2013,2016,2017, 2018, 2019 Loebner Prize Winner

The screenshot shows the official website for Mitsuku Chatbot. At the top left is a bronze medal with a profile of a man, labeled "Loebner Prize Winner 2013". The main title "mitsuku Chatbot" is in large, bold, orange letters, with "AN ARTIFICIAL LIFEFORM LIVING ON THE NET" in smaller text below it. To the right is a cartoon illustration of a young woman with blonde hair. Below the title is a menu bar with links: home • chat to me • news • chatlogs • tips • shop • contact us • awards • free aiml files links • gallery. The central part of the page features a "Mitsuku - Turing Test" window. It contains a conversation log where a user (YM) asks about the user's location and speaks Malaysian, to which Mitsuku responds positively. Below this, there are definitions for local terms like "Kau", "Aku", "Leng lui", and "Leng zai". The test concludes with a compliment from Mitsuku. To the right of the test window is a large, detailed anime-style illustration of a girl with green hair and blue eyes. Text next to the illustration provides instructions for interacting with Mitsuku, such as talking to her, clicking on her picture, and sharing her image. A timer at the bottom of the test window shows "02:10" and a "RATE NOW" button.

Briton Steve Worswick is the writer of the Mitsuku chatbot using Pandorabots

<https://www.pandorabots.com/mitsuku/>

# Pandorabots

- It is a free open-source-based community web service that enables anyone who wants to, to develop and publish chatbots on the web.
- It is the largest chatbot community on the internet and its 166,000 registered bot masters have created more than 206,000 pandorabots in multiple languages.

All pandorabots use AIML which was developed by Richard Wallace, whose chatbot A.L.I.C.E (Artificial Linguistic Internet Computer Entity) won the Loebner Prize in 2000, 2001 and 2004

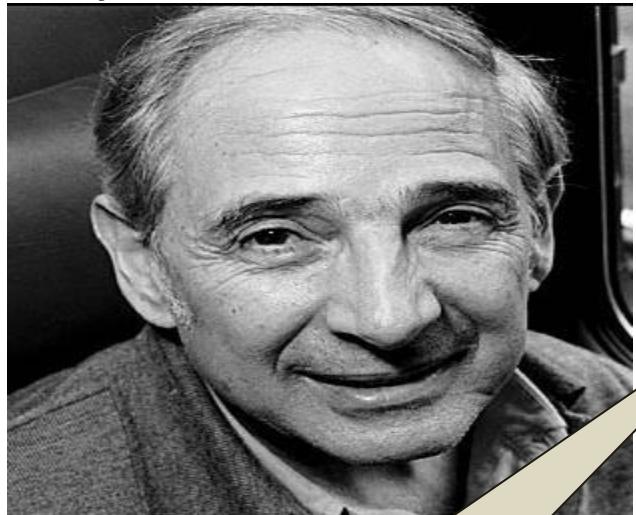


# Chatbot Tools

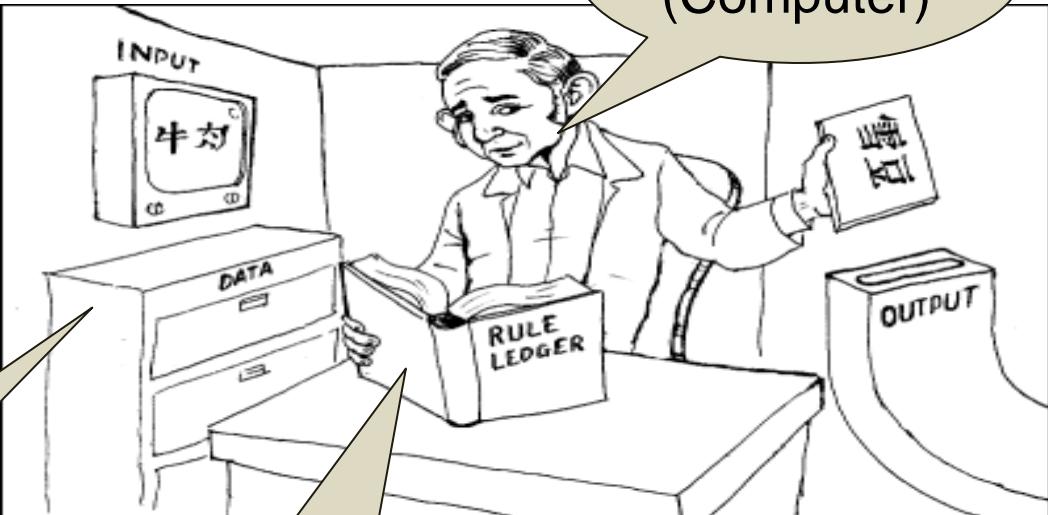
- For more details about Loebner Prize, check  
<https://aisb.org.uk/aisb-events/>
- For more information about AIML  
<https://pandorabots.com/docs/>
- For a comprehensive overview of chatbots in general,  
check [chatbots.org](http://chatbots.org)

# Critics on Turing Test - The Chinese Room

- by John Searle (1980)



Stacks of  
papers (storage)



Rule book  
(program)

# Example

```
If      x == "Wie geht es Ihnen"  
Then   y = "Mir geht es gut"
```

```
If      x == "Auf Wiedersehen" || x == "Wiedersehen"  
Then   y = "Tschüss"
```

What is the output for "Wiedersehen"?

# Conclusion?

- If the system clearly runs a program and passes the Turing Test, does it really understand anything of its inputs and outputs?
- Is it necessary for it to understand the inputs and outputs?

Problem Definition and Problem Solving

# NEXT LECTURE