



THE IRISH ACADEMY OF
ENGINEERING
ENGINEERING & TECHNOLOGY

THOUGHT LEADERSHIP IN A TIME OF GREAT CHANGE



CAETS Working Group(WG) on Artificial Intelligence(AI)

Report to CAETS Council meeting September 2025

by

WG Chair – Professor Barry O’Sullivan

Date: 09 September 2025



WG chair Barry O'Sullivan

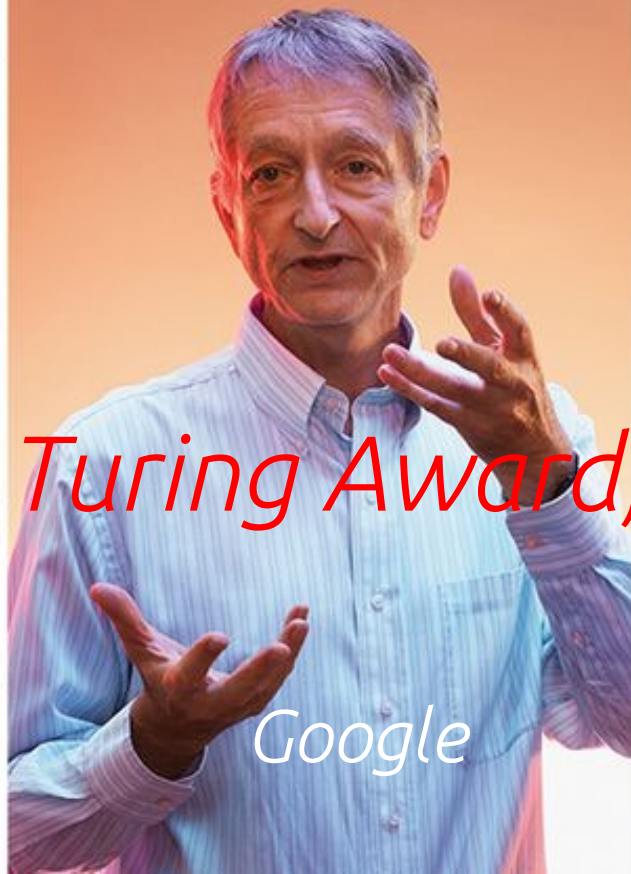
Professor Barry O'Sullivan, FAAAI, FAAIA, FEurAI, FIAE, FICS, MRIA
School of Computer Science & IT, University College Cork, Ireland
Visiting Professor, Computer Science, Northwestern, Evanston, Illinois
Director, Insight Research Ireland Centre for Data Analytics, UCC
Director, Research Ireland Centre for Research Training in Artificial Intelligence
Director, UCC Futures on Artificial Intelligence and Data Analytics
Editor-in-Chief, ACM AI Letters: <https://dl.acm.org/journal/ailet>
Chair, National Research Ethics Committee for Medical Devices
Member, Irish Government's Artificial Intelligence Advisory Council
LinkedIn: <https://www.linkedin.com/in/barryosullivan/>

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Element.ai

ACM Turing Award, 2018



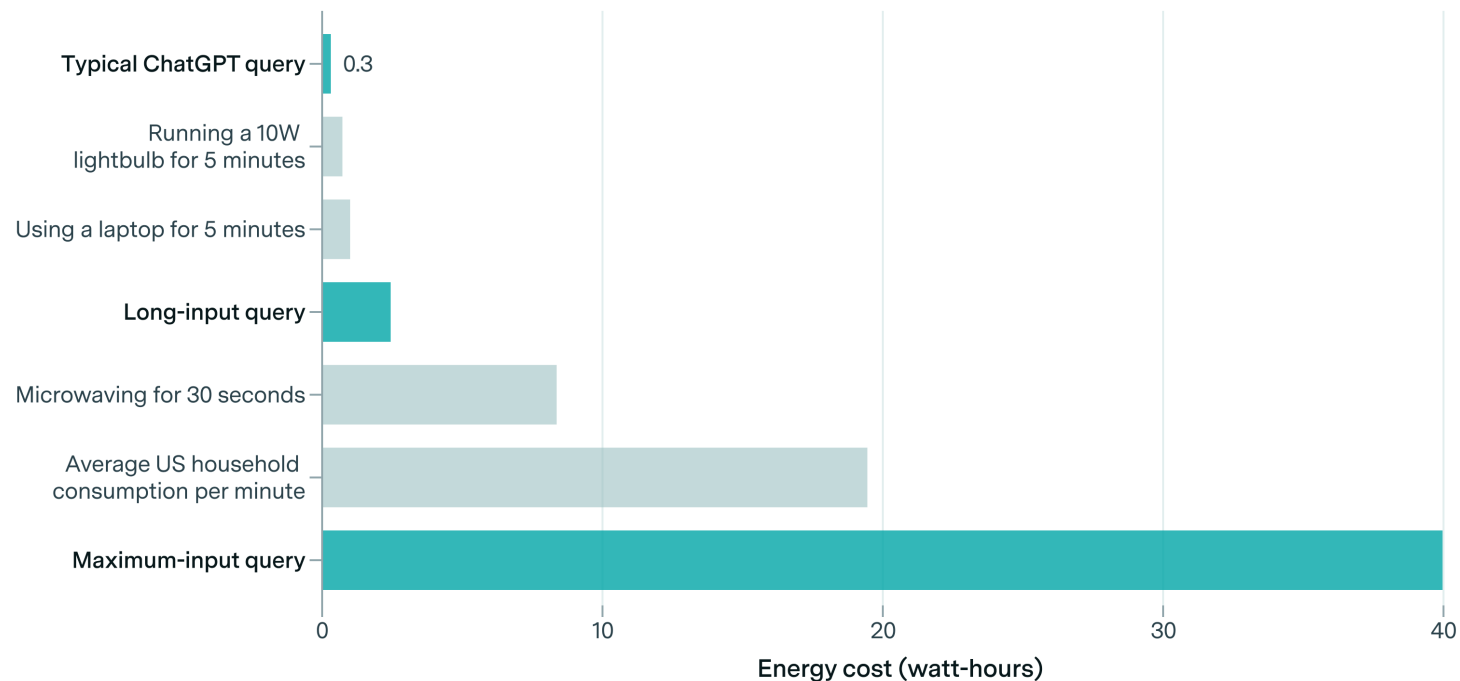
ARTIFICIAL
INTELLIGENCE



ChatGPT

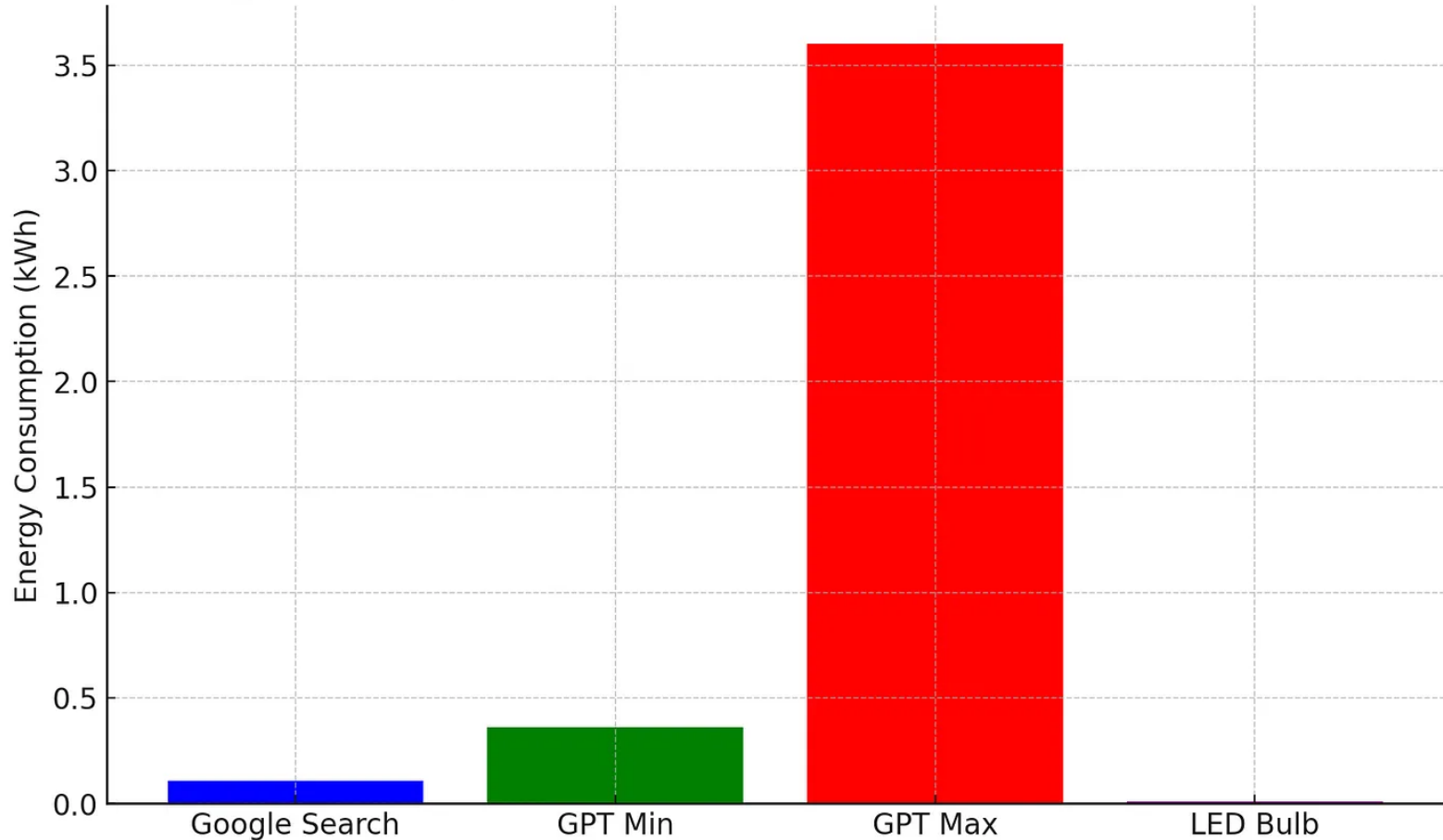


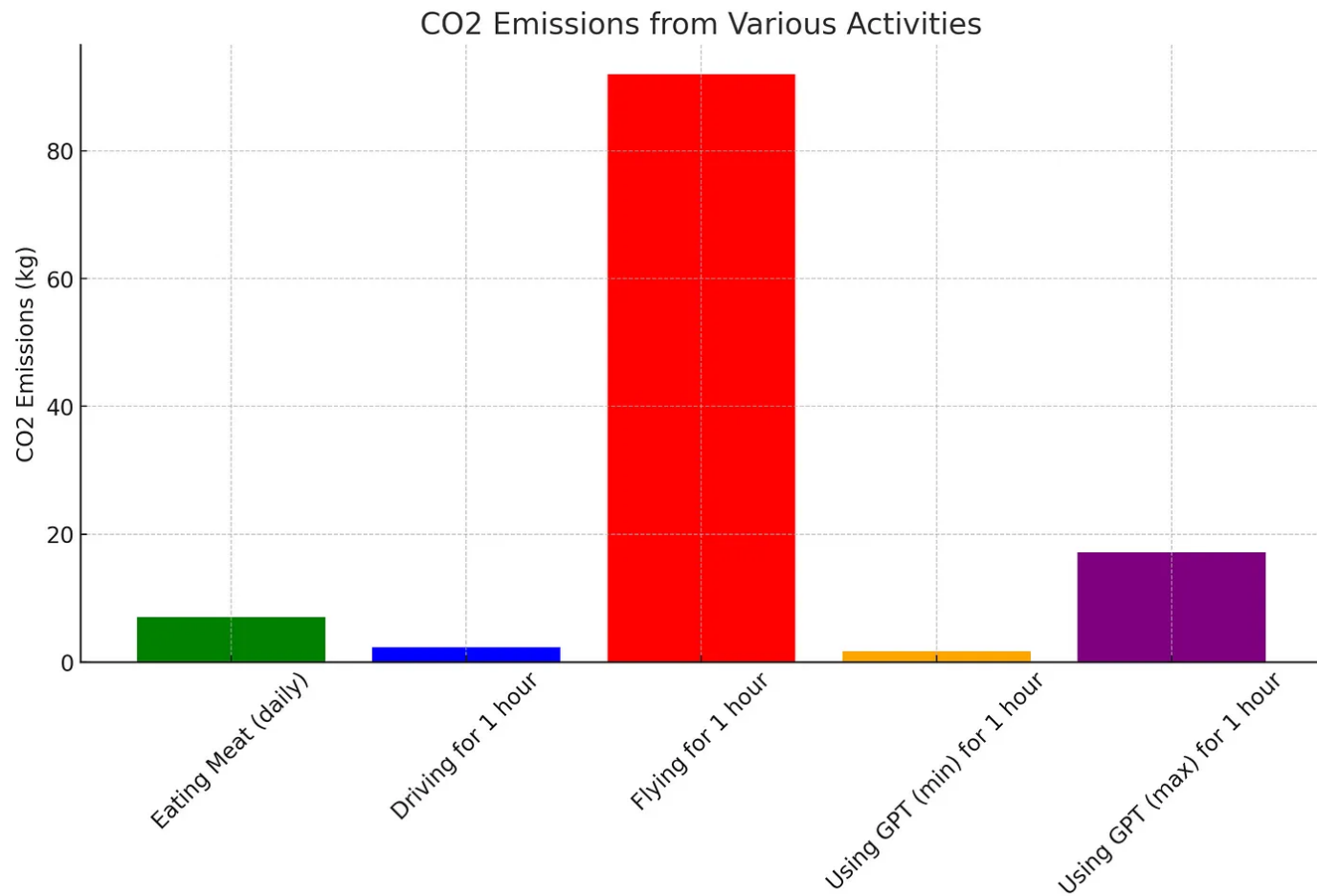
Energy consumption per ChatGPT query is small compared to everyday electricity use



Pessimistic estimates of the energy usage of ChatGPT with GPT-4o across for different query lengths: typical (<100 words), long (~7,500 words), and maximum context length (~75,000 words), with an average response length of 400 words.

Energy Consumption Per Hour: Google Search vs GPT vs LED Bulb







DeepL CEO Challenges Microsoft And OpenAI's \$100 Billion AGI Definition

By [Charles Towers-Clark](#), Contributor. © Charles Towers-Clark writes about h...

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Microsoft and OpenAI recently sparked controversy by defining artificial general intelligence not through technical achievement, but through profit — specifically, \$100 billion in annual earnings. This benchmark appears in their partnership agreement, essentially allowing Microsoft to retain access to OpenAI's innovations until this financial goal is met, likely well into 2029.



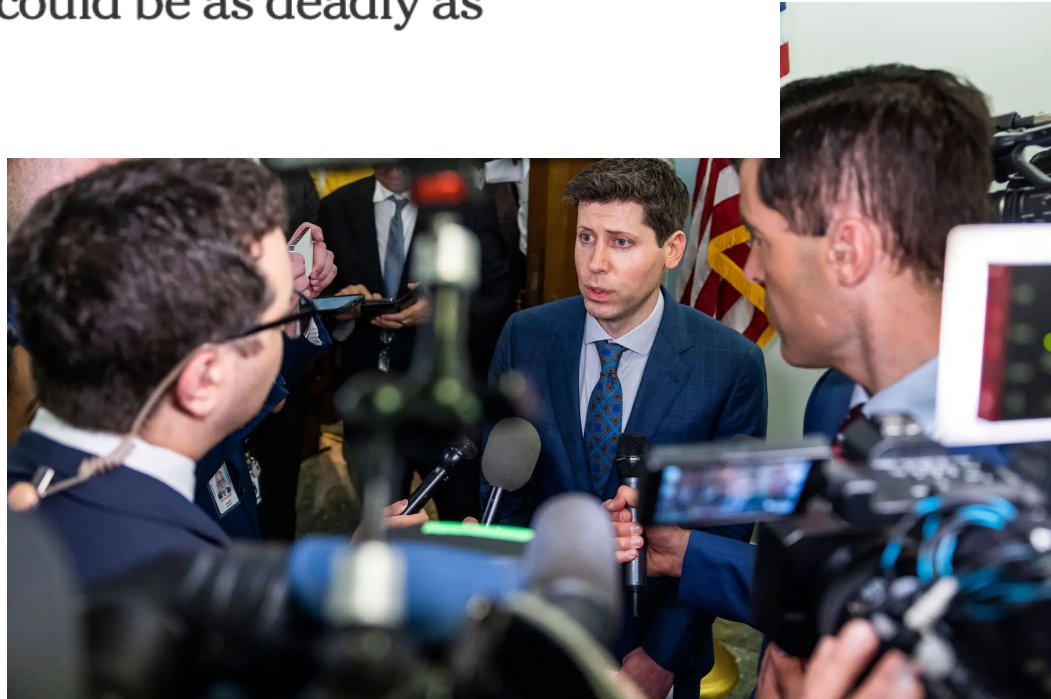
How do we define AGI?
CHARLES TOWERS-CLARK USING DALL-E

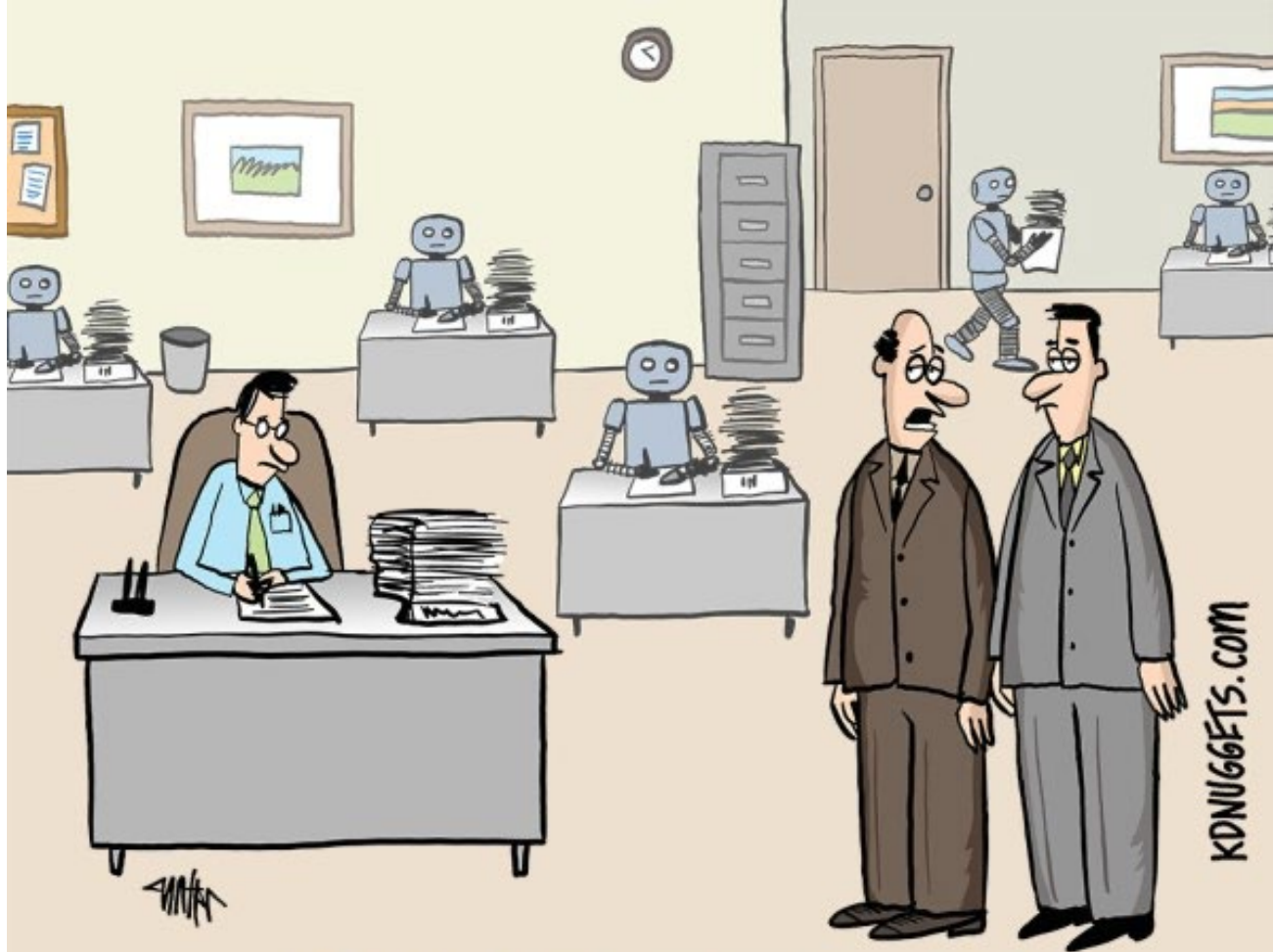
Forbes

A.I. Poses 'Risk of Extinction,' Industry Leaders Warn

Leaders from OpenAI, Google DeepMind, Anthropic and other A.I. labs warn that future systems could be as deadly as pandemics and nuclear weapons.

The New York Times





KDNUGETS.COM

**"The robots have taken over almost all jobs,
but we still need Jenkins to cheat on our taxes"**

Ireland's Artificial Intelligence Heritage



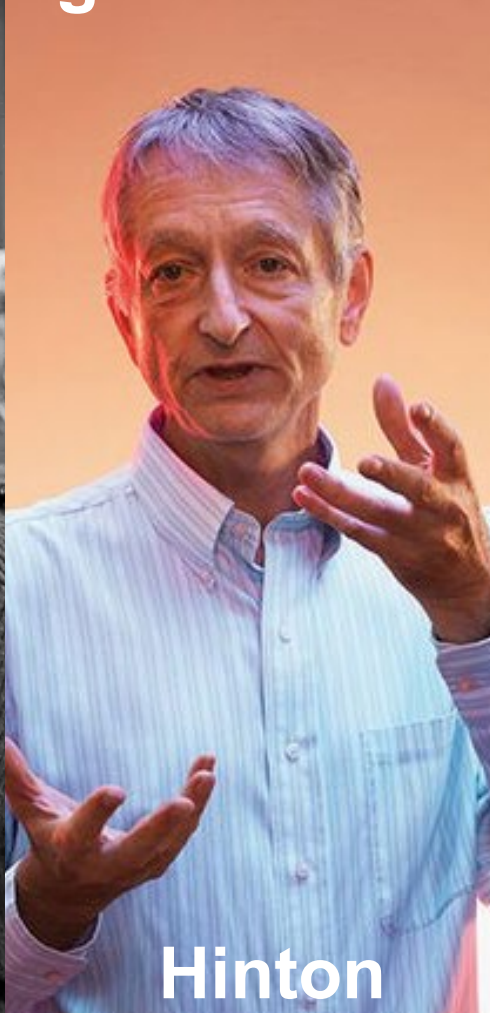
Boole



Turing



McCarthy



Hinton

Of the scene would have formed a good
subject for a painter. — As Boole had discovered
that trains of reasoning might be conducted
by a mathematical process, and Babbage had
invented a Machine for the performance of
mathematical work, the two great men
together seemed to have taken steps towards
the construction of that grand prodigy, a
Thinking Machine.



*G. Boole
Queen's College
Cambridge*

AN INVESTIGATION
OF
THE LAWS OF THOUGHT,
ON WHICH ARE FOUNDED

COMPUTING MACHINERY AND INTELLIGENCE

By A. M. Turing

1. The Imitation Game

I propose to consider the question, "Can machines think?" This should begin with definitions of the meaning of the terms "machine" and "think." The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is dangerous. If the meaning of the words "machine" and "think" are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question, "Can machines think?" is to be sought in a statistical survey such as a Gallup poll. But this is absurd. Instead of attempting such a definition I shall replace the question by another, which is closely related to it and is expressed in relatively unambiguous words.

The new form of the problem can be described in terms of a game which we call the 'imitation game.' It is played with three people, a man (A), a woman (B), and an interrogator (C) who may be of either sex. The interrogator stays in a room apart from the other two. The object of the game for the interrogator is to determine which of the other two is the man and which is the woman. He knows them by labels X and Y, and at the end of the game he says either "X is A and Y is B" or "X is B and Y is A." The interrogator is allowed to put questions to A and B thus:

C: Will X please tell me the length of his or her hair?

Now suppose X is actually A, then A must answer. It is A's object in the game to try and cause C to make the wrong identification. His answer might therefore be:

"My hair is shingled, and the longest strands are about nine inches long."

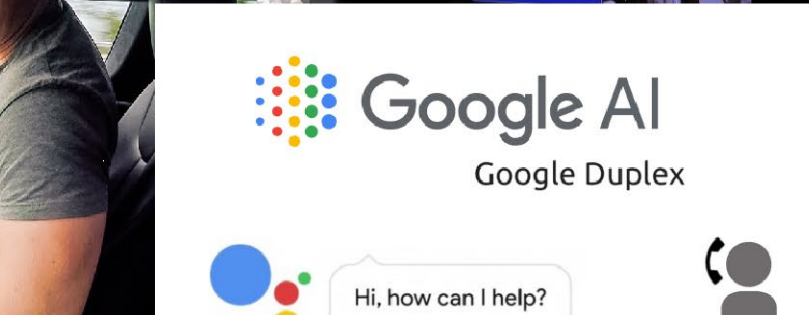
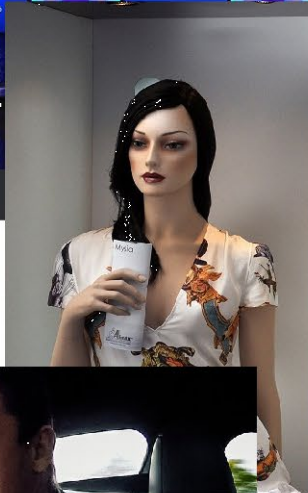
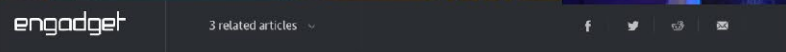
In order that tones of voice may not help the interrogator the answers should be written,



A PROPOSAL FOR THE
DARTMOUTH SUMMER RESEARCH PROJECT
ON ARTIFICIAL INTELLIGENCE

We propose that a 2 month, 10 man study of artificial intelligence be carried out during the summer of 1956 at Dartmouth College in Hanover, New Hampshire. The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it. An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves. We think that a significant advance can be made in one or more of these problems if a carefully selected group of scientists work on it together for a summer.

August 31, 1955



Creation of CAETS AI Working Group

May 2024 – VC Meeting to agree logistics

- Ruth David –CAETS Secretary/Treasurer
- Barry O’Sullivan – WG Chair
- Tom Leahy – IAE Director/Past President

June 2024 – Inception meeting of WG

Agreed schedule of WG meetings – monthly from 13.00-14.30 (GMT) on the third Tuesday of every month.

Initial expressions of interest – 45 CAETS Academy members.

Document sharing - using google docs.

CAETS AI Working Group Challenges

- Topic is of great international interest
- Advancing very quickly – Any report drafted by CAETS likely to be overtaken by events before publication.
- Lack of administrative support from CAETS
- Meeting times over different time zones
- Over a calendar year the initial interest from 45 CAETS members dwindled to about a dozen active WG members

CAETS AI Working Group identified key topics related to AI in possible topics paper.

Overview of AI and Engineering (Engineering the Age of AI)

Engineering the Age of AI

- | | |
|---|--|
| 1 | Overview, Purpose and Audience (audience being CAETS and external) |
| 2 | Overview of AI (including GenAI appropriately, pointing to interesting resources, include standards, ethics and legal/regulatory matters also) |

Part 1- Engineering with and for AI

- | | |
|---|---|
| 3 | AI for Engineering (and Scientific) Practice |
| 4 | Education: AI and Engineering |
| 5 | Engineering for AI Systems |
| 6 | Economy and Future of Work (careful not to overly focus on GenAI) |

Part 2 - AI for Good

7 AI and Sustainability

8 Equality, Diversity and Inclusion

Part 3 - Enabling Progress

9 AI and International Cooperation (intellectual property issues, export controls)

10 Investment in AI and Adoption (examples from the major international geographies)

11 Recommendations and Conclusions

Appendix Relevant reading and information

Next steps by CAETS

A. Contributions for some but not all individual report chapters have been promised and are in preparation.

B. It is planned to complete this phase with an interim summary in Q4 2025 of all contributions received.

Going beyond this requires:

1. A new WG/Chair and relevant contributions from CAETS Academies & subject matter experts
2. Support by an administrative team
3. Building on the foundations achieved by this WG
4. Recognising the very rapid deployment of AI



I want to thank all the WG members who have remained active and enthusiastic and thank CAETS for the opportunity to contribute to a very active debate on AI,

CAETS AI WG chair Barry O'Sullivan