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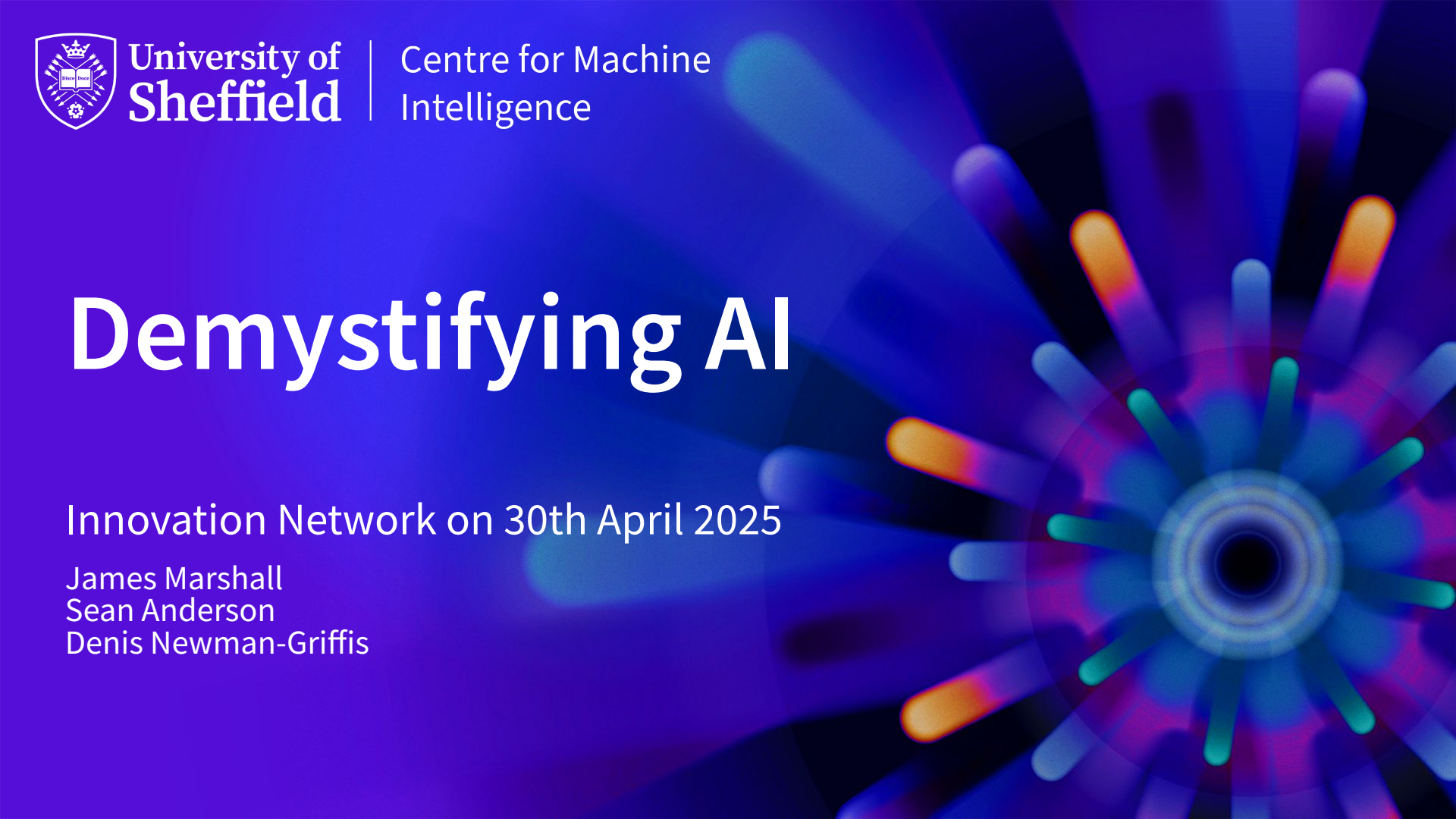
Demystifying AI

Innovation Network on 30th April 2025

James Marshall
Sean Anderson
Denis Newman-Griffis



Schedule

Start 09:40	Welcome and Opening Remarks	2 mins	James
…	What is AI?	8 mins	Sean
…	AI Thinking Framework	10 mins	Denis
Finish 10:05	Q+A	5 mins	All

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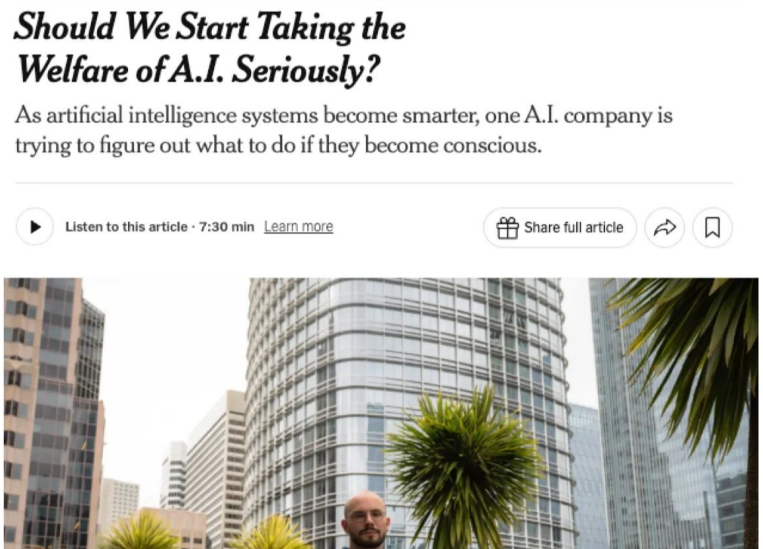
Welcome

James Marshall

Director of the CMI

What we want you to know

- Modern AI is rapidly changing all aspects of business
- Like all disruptive technologies it comes with **benefits** and with **risks**
- Some benefits and risks are more real than others



Should We Start Taking the Welfare of A.I. Seriously?

As artificial intelligence systems become smarter, one A.I. company is trying to figure out what to do if they become conscious.

Listen to this article · 7:30 min Learn more

Share full article

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What is AI?

Sean Anderson

CMI Upskilling Lead

What is AI?

Artificial Intelligence (AI) is essentially the ability of machines to simulate human intelligence

Examples: learning, communication, problem-solving, and making decisions.

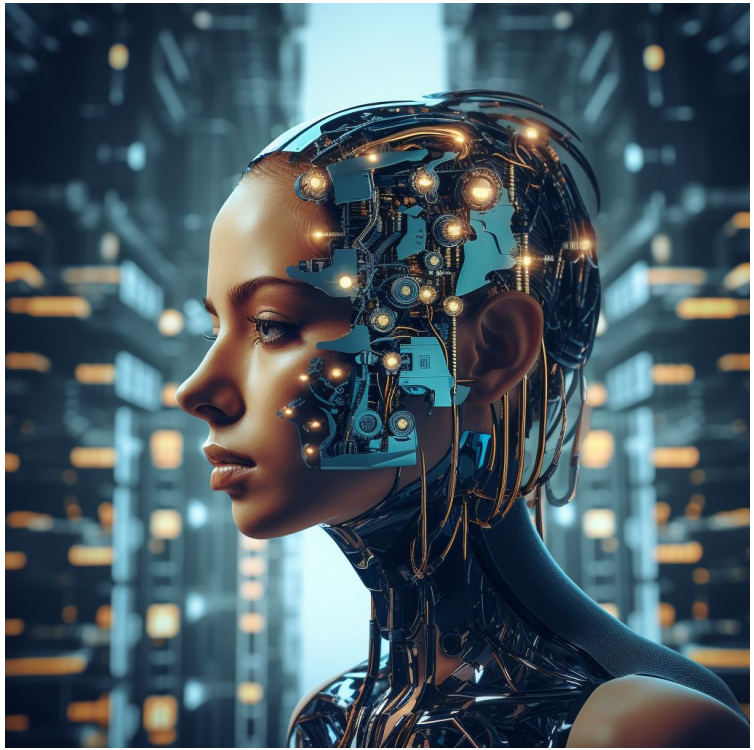


Image source
https://decentcybersecurity.eu/quantum-computings-impact-on-artificial-intelligence-and-machine-learning-in-2024/

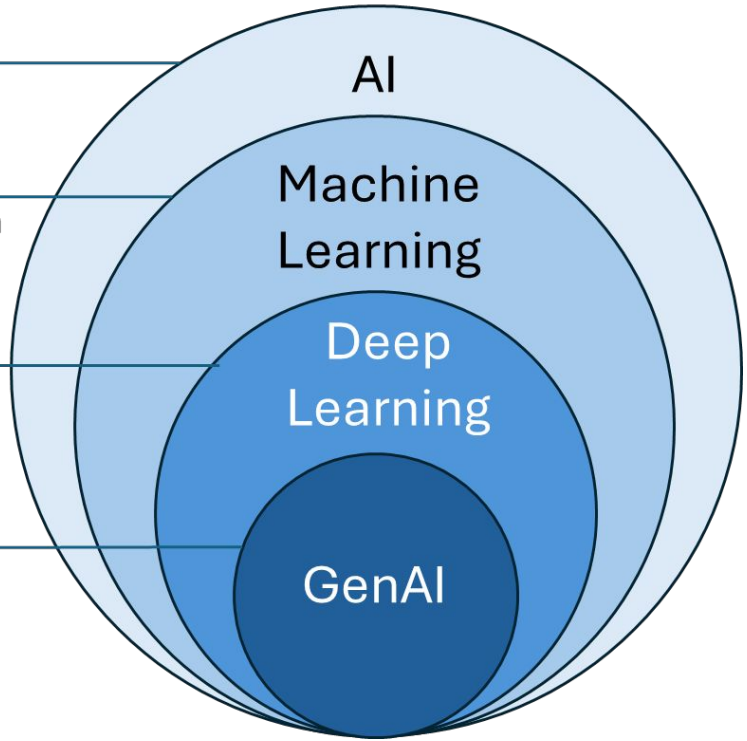
AI to GenAI

Artificial Intelligence
Machines with human-like abilities

Machine Learning
A field of AI where machines learn from data

Deep Learning
A type of machine learning based on neural networks – suited to complex problems

Generative AI
A type of AI system, usually based on deep learning, that generates media content



A brief history of major developments in AI

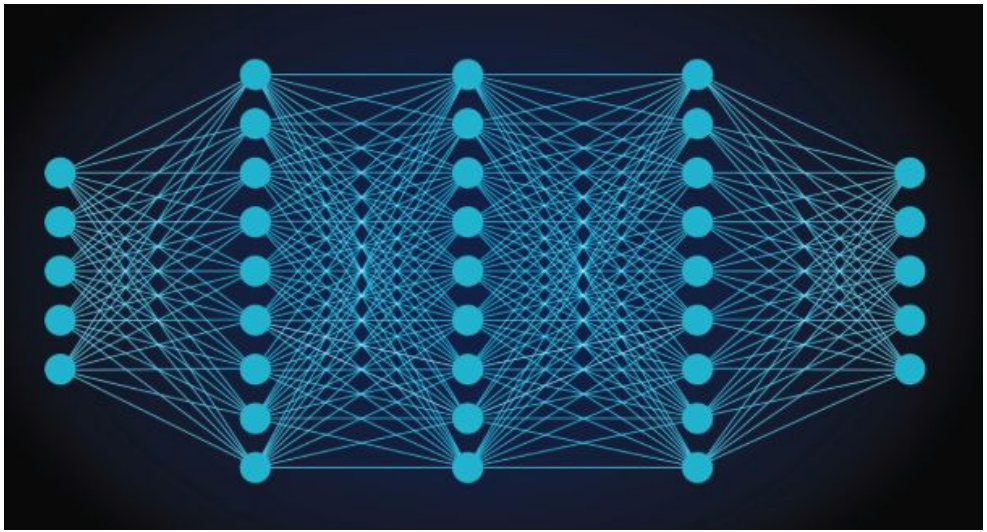
- 1950s: Proposals to use computers to imitate human intelligence (Turing)
- 1980-90s: Symbolic AI systems, e.g. expert systems, reach their highpoint

- 2010s: Deep learning emerges as ‘human competitive’ in image classification, etc.
- 2017: Transformer deep learning model developed
- 2018: Generative Pre-trained Transformers (e.g. ChatGPT) invented
- 2022: ChatGPT public release
- 2024: Nobel prizes in Physics and Chemistry awarded to AI pioneers

Deep Learning

Deep learning models are very large chains of simple mathematical functions, (a bit) analogous to neurons in your brain – with sufficient training data they can learn to do things like recognise animals in images or words in speech

Input

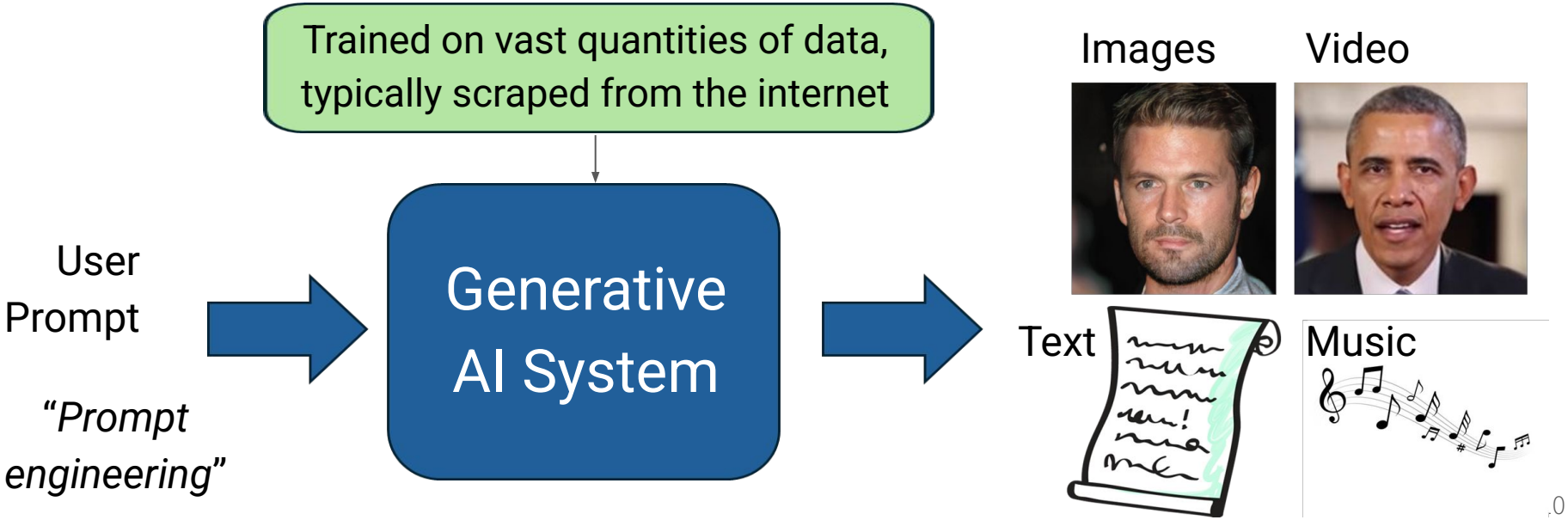


Output

“cat”

Generative AI

Generative AI (**GenAI**) is an artificial intelligence system that generates text, images, audio, video or other media in response to user prompts.



Large Language Models (LLMs), e.g.

E.g.: LLMs combine deep nets with an ‘attention’ mechanism that learns which parts of the context are most relevant to predict the next token (word, in this example)

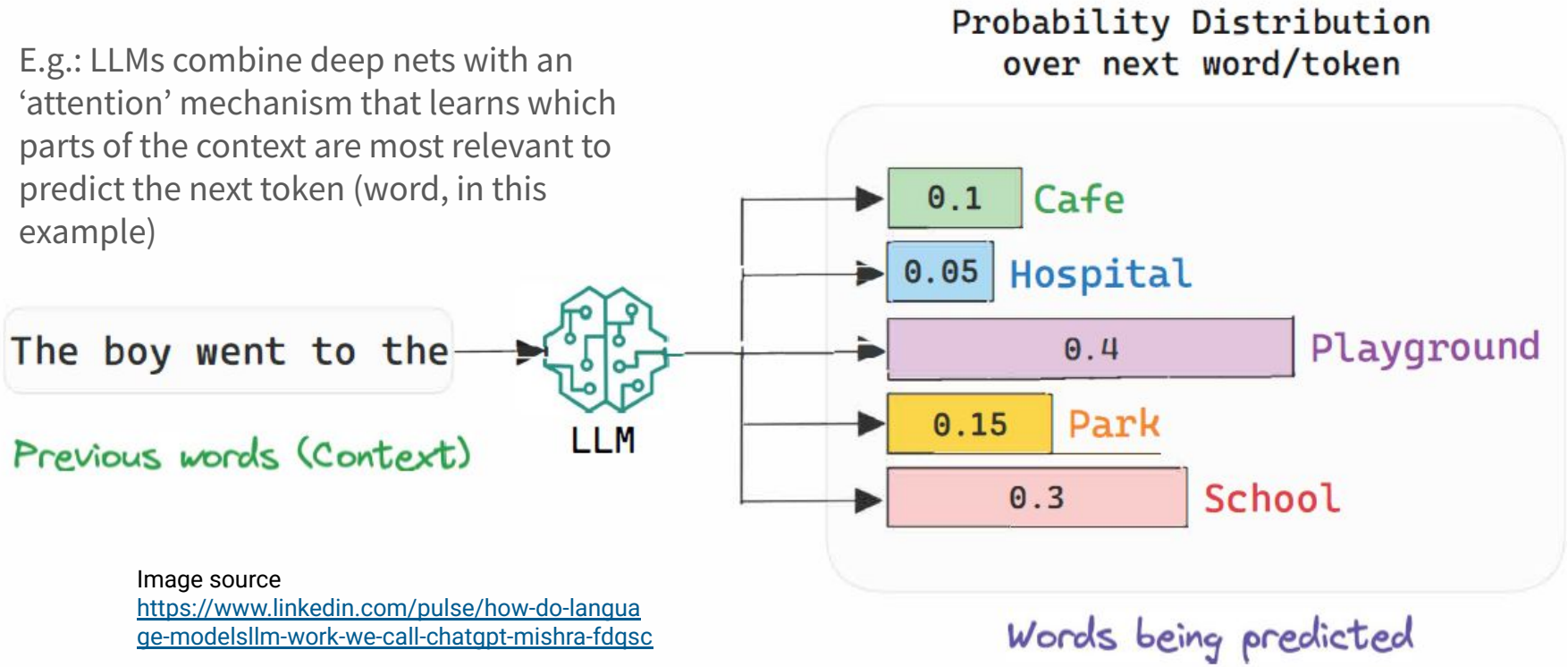


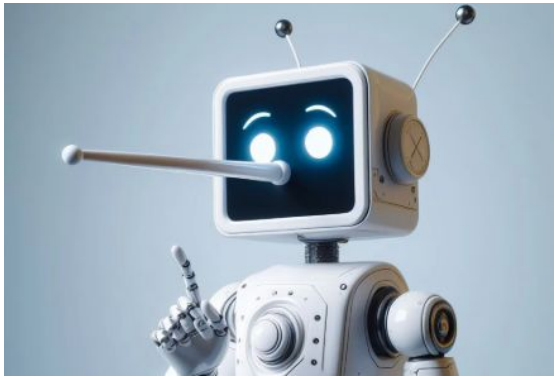
Image source
https://www.linkedin.com/pulse/how-do-language-modelsllm-work-we-call-chatgpt-mishra-fdqsc

Use-cases of Large Language Models

Image source https://geniusee.com/single-blog/llm-use-cases-in-business

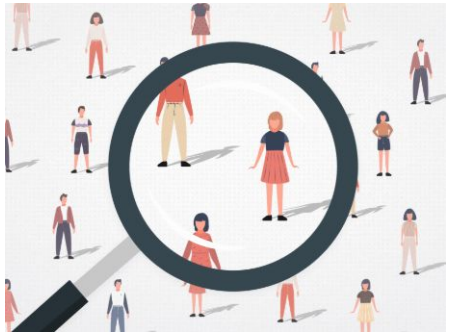
Challenges with LLMs

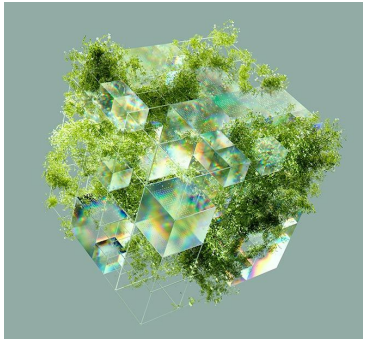
Data Privacy



Hallucinations

Data Bias

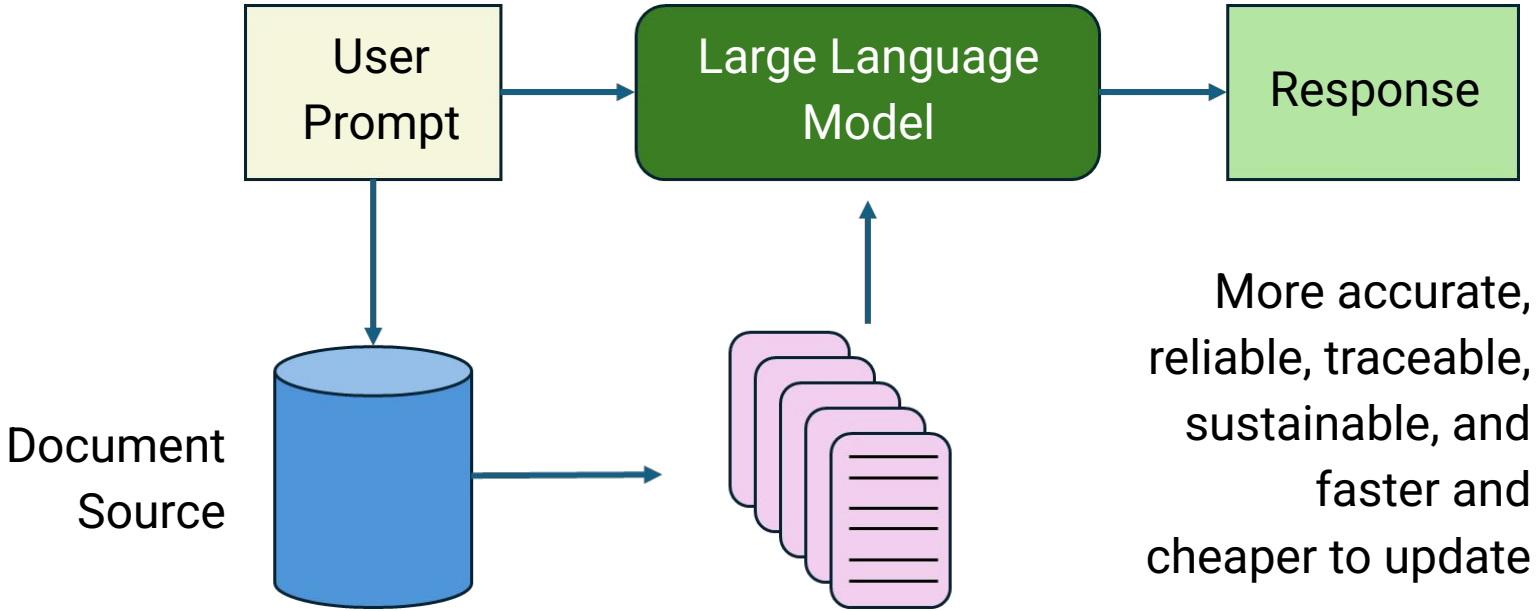




Sustainability

Mitigation example: Retrieval Augmented Generation

Retrieval-augmented generation (RAG) is a technique for enhancing the accuracy and reliability of Large Language Models (LLMs) using factual sources.



How to get started?
BridgeAI: Government Support for Businesses

Empowering UK organisations to harness the power of AI through support and funding

- AI adoption toolkit
- Voucher scheme for these industries:
  - Agrifood
  - Construction
  - Creative industries
  - Transport (including logistics and warehousing)

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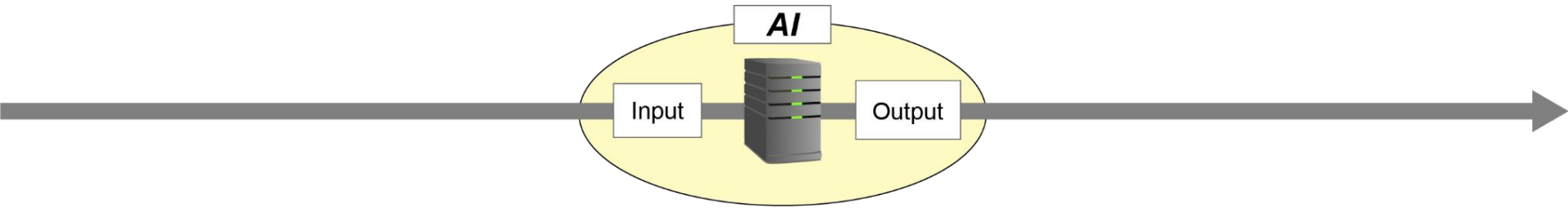
AI Thinking Framework

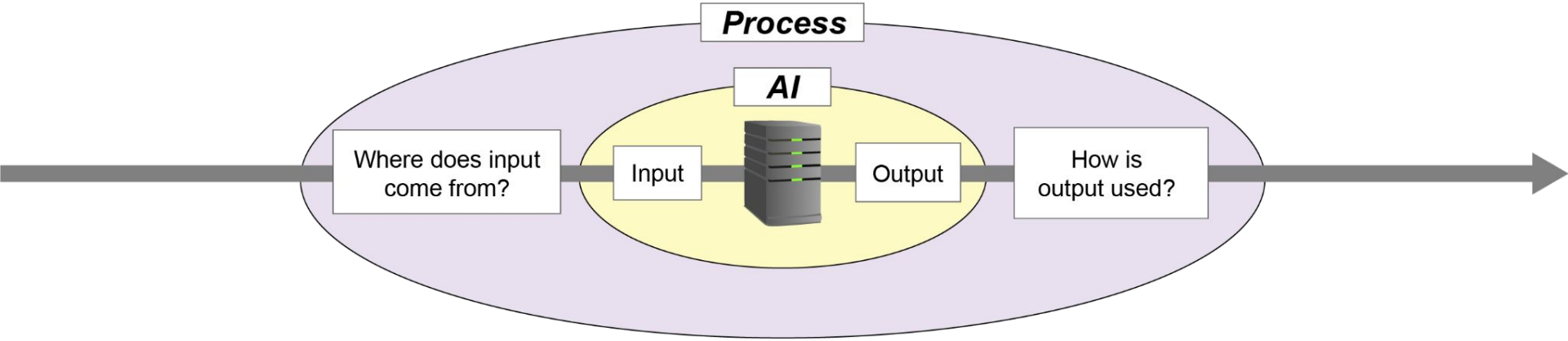
Denis Newman-Griffis

CMI Lead on AI-Enabled Research

Putting AI applications in context



Putting AI applications in context



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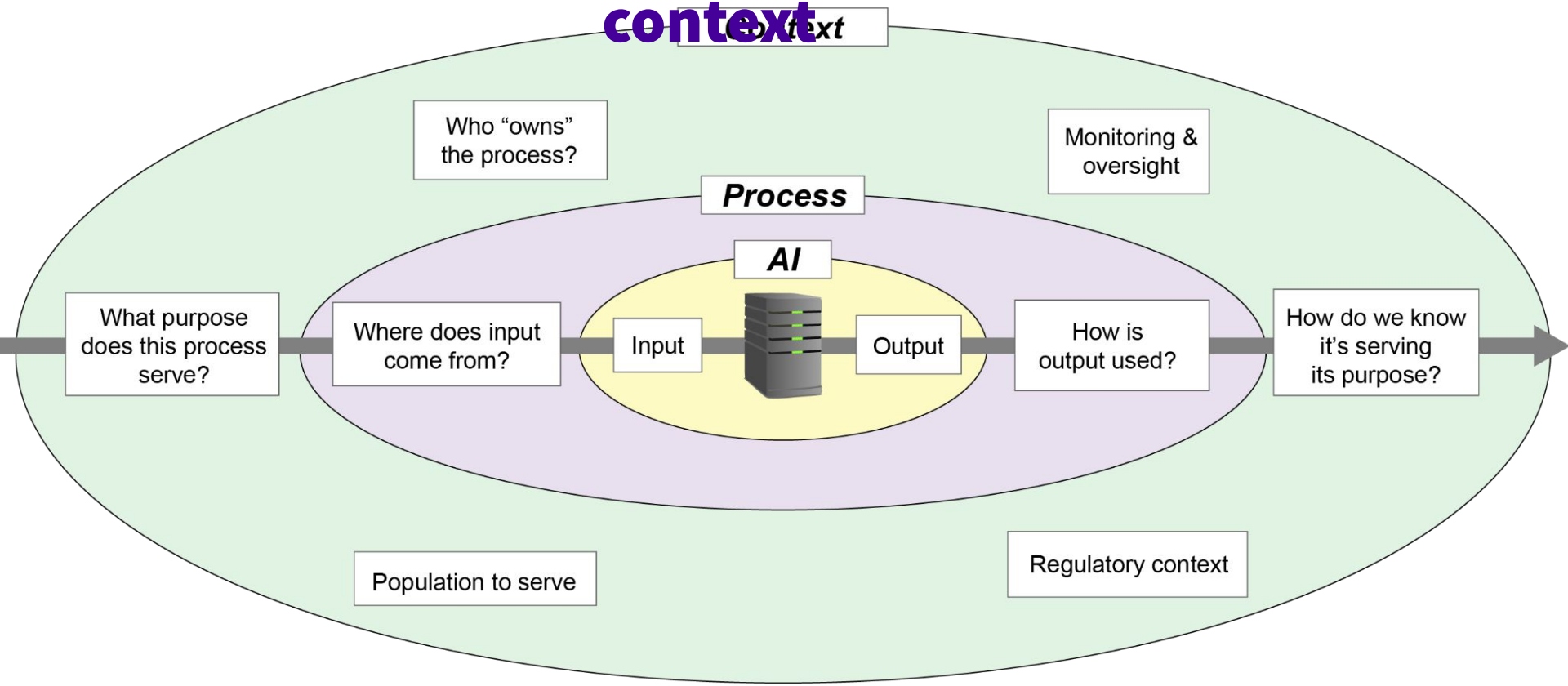
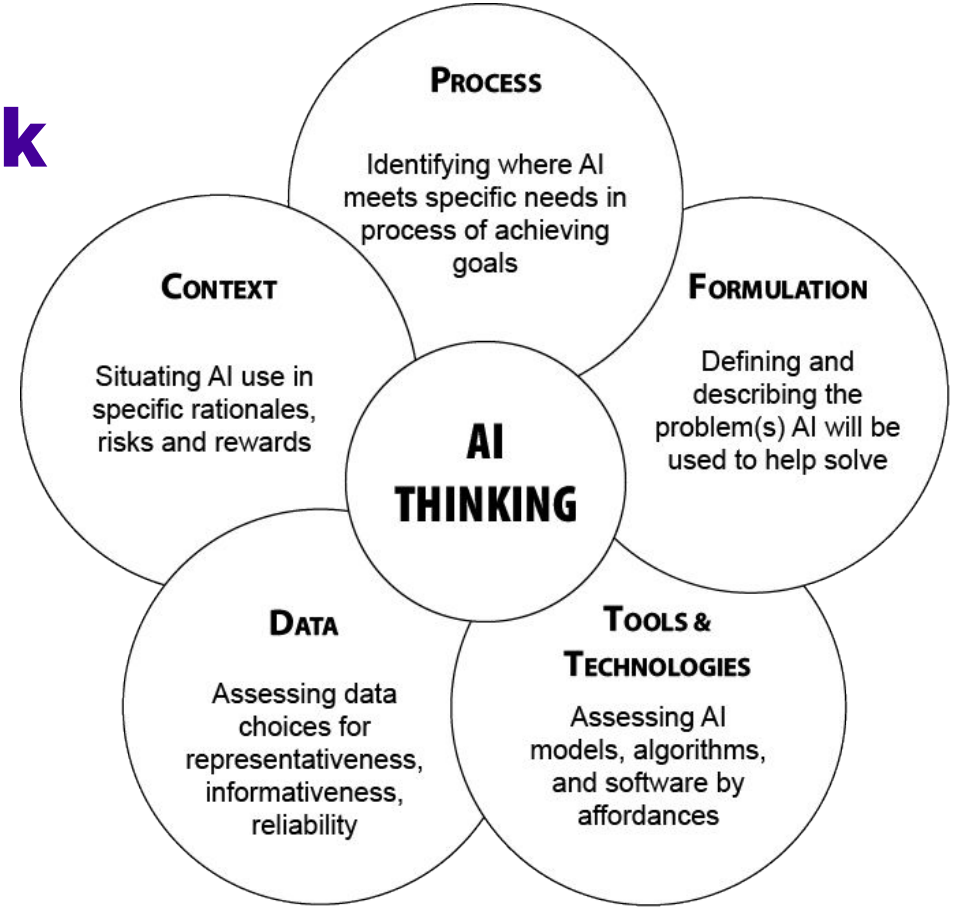
Putting AI applications in context



AI Thinking framework

- **Bridge different understandings** of AI
- Model **different AI skills needs**
- Competencies needed for **AI teams**
- **Jumping-off point** for specific applications



Process

Being **goal-driven**

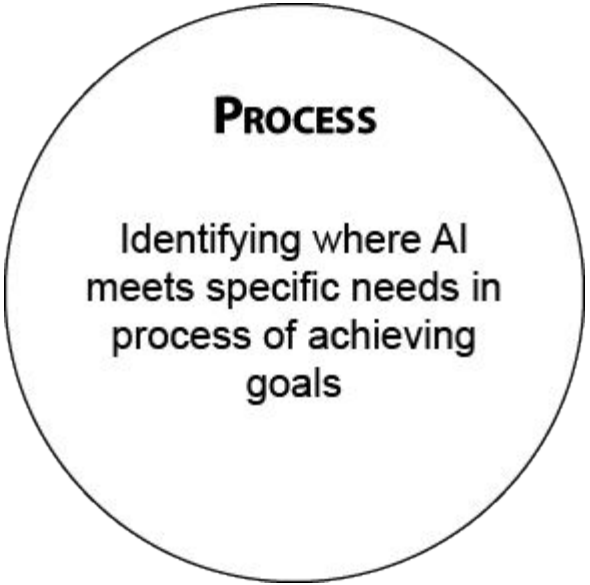
➔ Start from the problem, not the solution

Defining scope for AI use

➔ Targeting distinct steps or operations

Responding to **specific opportunities**

➔ Specific information in a process



Formulation

AI task to perform

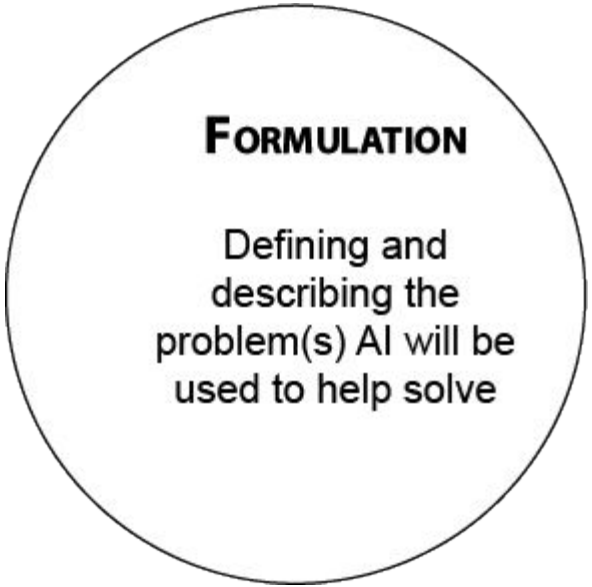
➔ Known paradigms for AI

Output to produce

➔ Category, number, text, multiple values...

Training signal to learn from

➔ What indicates the pattern you want to learn from?



Tools & Technologies

Purpose & paradigm of a technology

➔ What input/output problem was this built to solve?

Complexity & data requirements

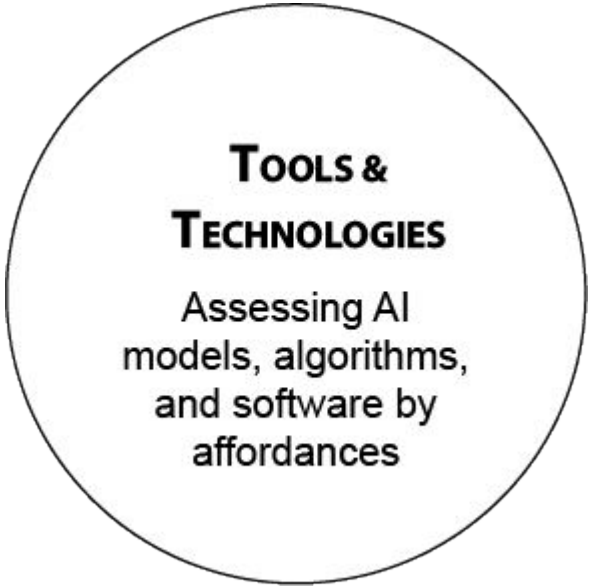
➔ How much data are needed?
How fine-grained can it learn?

Computational requirements

➔ What hardware will you need?

Strengths and limitations for your task

➔ Fit for *this* purpose



Data

Representativeness

➔ Will it tell you about the people you want to know about?

Informativeness

➔ Does it tell you what you want to know?

Reliability

➔ Noisiness, consistency of collection, availability

Context

Stakeholders for AI use

➔ Who is affected?

Stakeholder **rationales**

➔ What do they want to accomplish?

Risks to rationales

➔ How might AI harm accomplishing these goals?

Measures of success

➔ How do you know it's working?

How could a team use AI Thinking?

- ➔ **Formation**: Identify relevant people from around the organisation with the right skills
- ➔ **Structuring**: Guide team in identifying key decisions and considerations for AI use
- ➔ **Accountability**: Structure for targets to report/assess against
- ➔ **Recognising contributions**: Showing that AI ‘takes a village’

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Want to know more?

Get in touch!

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Dr Sean Anderson s.anderson@sheffield.ac.uk

Or contact the **CMI team** at cmi-enquiries@sheffield.ac.uk

Read the AI Thinking paper by scanning this QR code:

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Thank you

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