



Science and  
Technology  
Facilities Council

Hartree Centre | Northern Ireland Hub

# Welcome

# Agenda

## 1 Possibilities of AI

How AI can transform your business

## 2 Hartree NI Hub and Funding

Purpose, Goals, and Engagement

## 3 AI Identification Workshop

Data collection, analysis and change

## 4 Case Studies and Health Clinics

Speak to an expert



Hartree Centre | Northern Ireland Hub

# Hartree Centre NI

Realise the Data and Artificial Intelligence (AI) Opportunity within your business.

Thursday March 21st

09:00 – 13:00

The Innovation Centre

Derry~Londonderry



Hartree Centre  
Northern Ireland Hub





Science and  
Technology  
Facilities Council

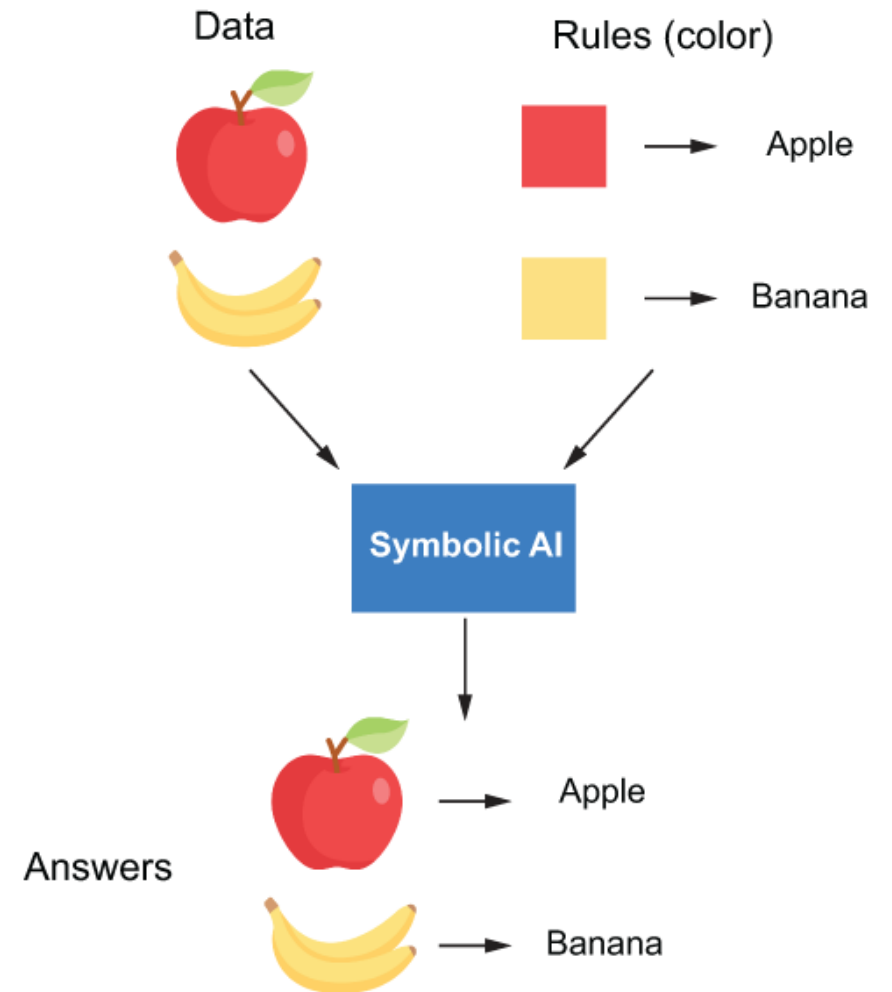
Hartree Centre | Northern Ireland Hub

# AI Possibilities



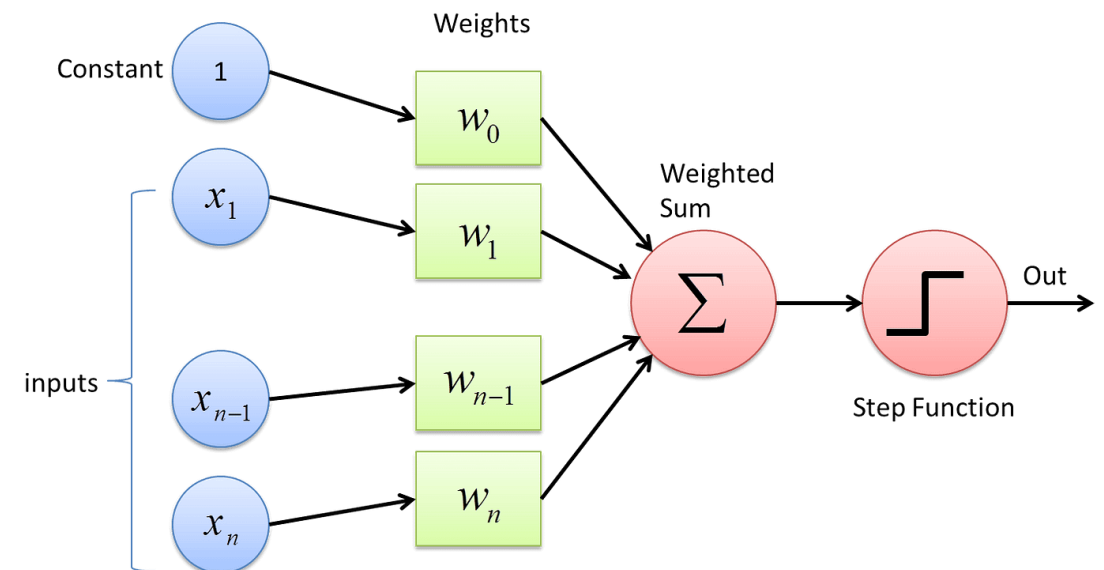
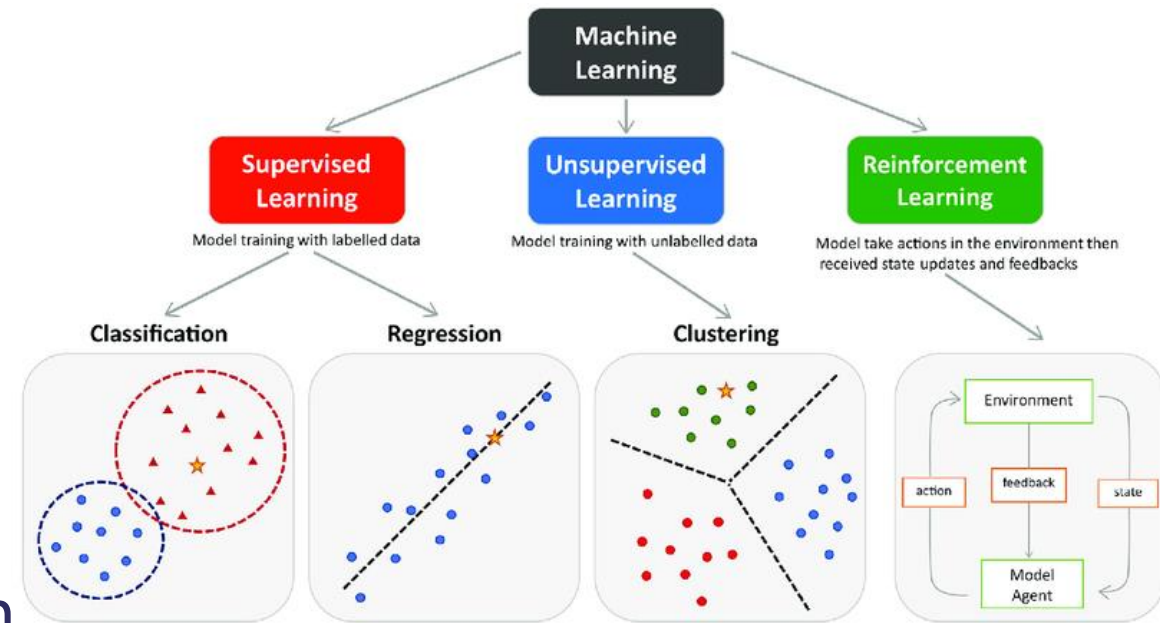
# What is Artificial Intelligence (AI) ?

- Self-driving cars, robots, ChatGPT.
- AI has been around since the 1950s
- “Machine's ability to perform a task that would've previously required human intelligence”
- Symbolic AI (1950-1990) is a knowledge-based approach with pre-coded, symbolic rules of reasoning



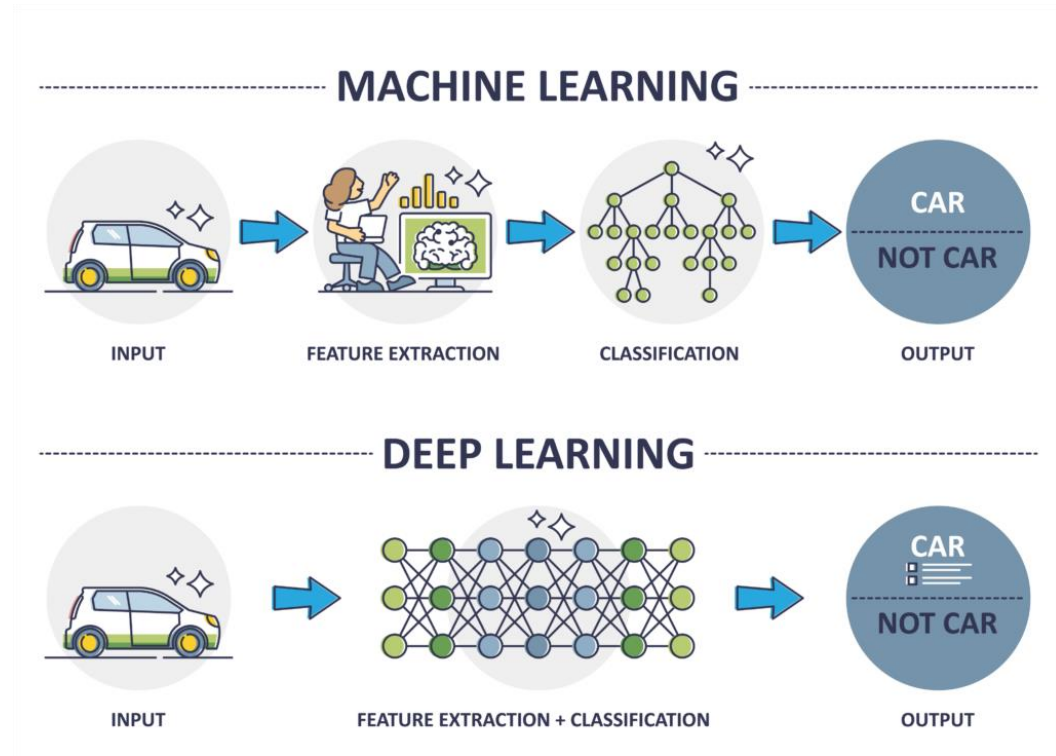
# Machine Learning (ML)

- Enables learning from **data** to make **predictions** without being explicitly programmed.
- Predictions can be generated through **supervised learning**, where algorithms learn patterns from existing data, or **unsupervised learning**, where they discover general patterns in data.



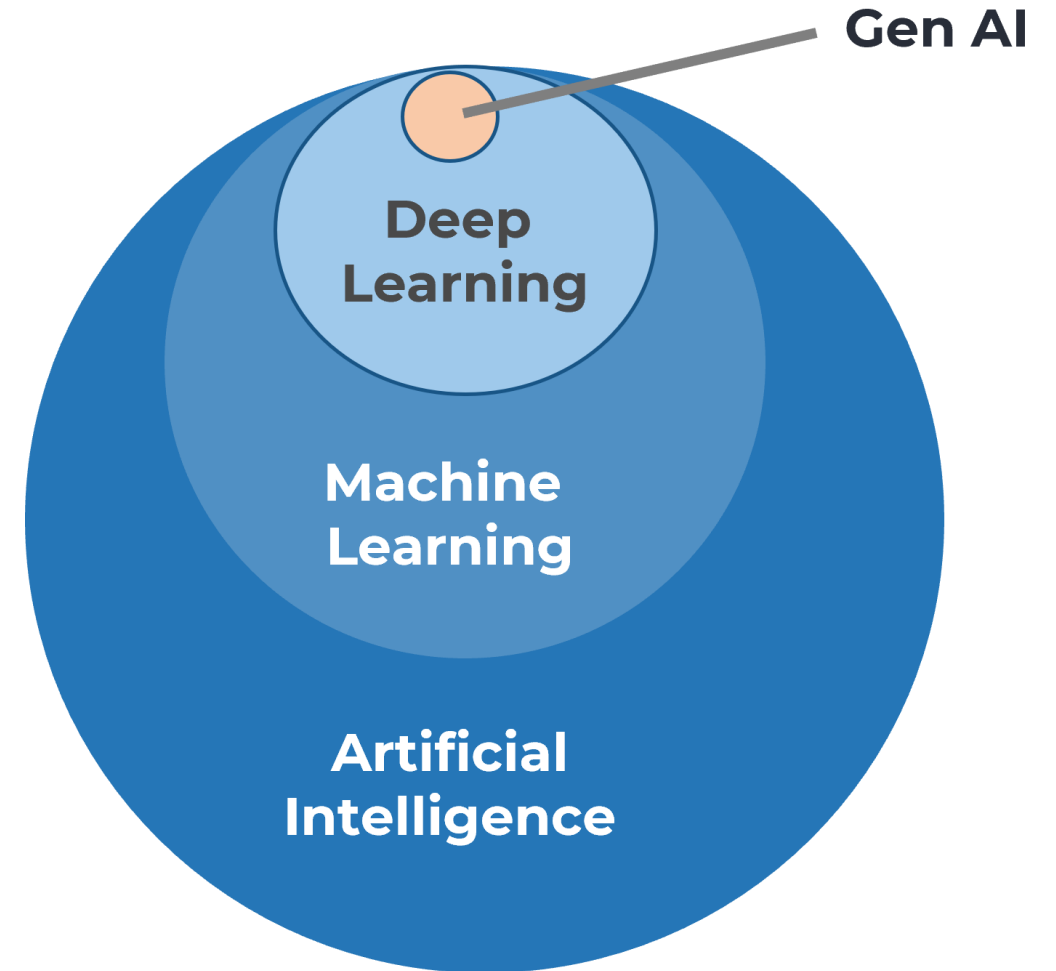
# Deep Learning (DL)

- Specialised subset of ML, distinguished by its use of neural networks with **three** or more layers.
- These networks simulate behaviour of the human brain to "learn" from **large amounts** of data.



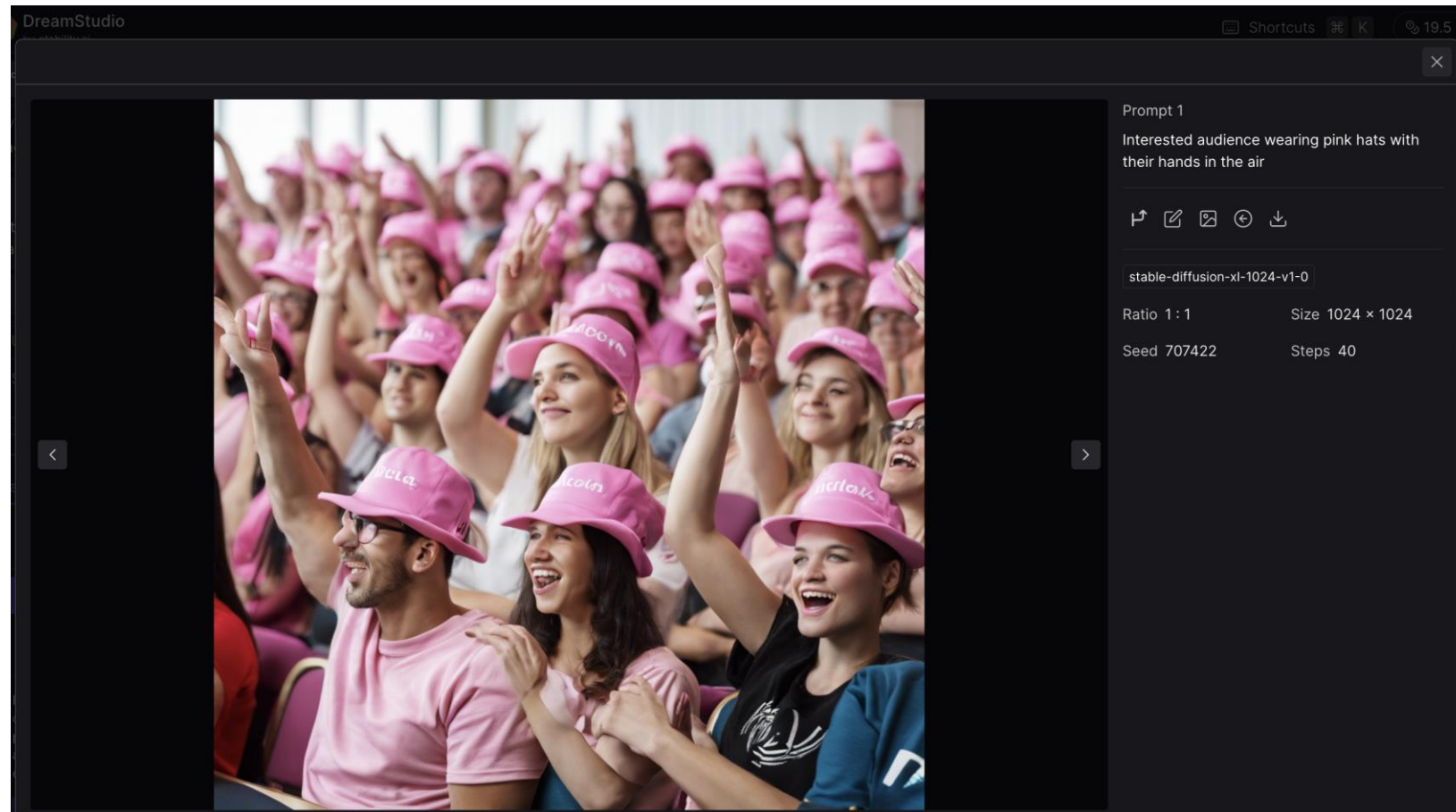
# Generative AI

- Relatively new form of AI that creates **original output**.
  - ML focuses on making predictions or based on existing data.
- Examples of generative AI:
  - AI-generated text
  - AI-generated images
  - AI-generated speech
  - AI-generated video



# Generative AI

“Interested audience wearing pink hats with their hands in the air”

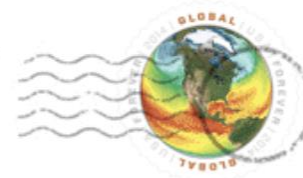


**“one of the most successful applications of Machine Learning for developing a real-time engineered system.”**



# A Machine Learning Success Story

## Pioneering work on Postal Automation at UB



**Handwriting recognition for postal automation**



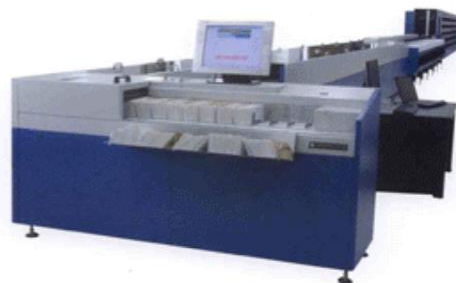
**Saving hundreds of millions of dollars in labor costs for the US Postal Service**



**Over 95% of US letter mail sorted without manual intervention**

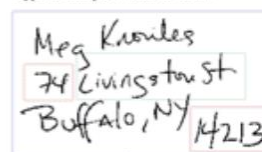


**Technology licensed to Australia Post and UK's Royal Mail**



Mail Transport Hardware  
(Processing/Sorting)

Typical Mail-piece Address Block :



ZIP and Primary Number Recognition  
 ZIP Code: 14213 Database Query  
 Primary Number: 74

| Lexicon Entry (Street Name) | Addon |
|-----------------------------|-------|
| BRADLEY ST                  | 1024  |
| COLONIAL CIR                | 1467  |
| DEWITT ST                   | 1534  |
| GRANT ST                    | 1905  |
| HAMPSHIRE ST                | 2012  |
| HAWLEY ST                   | 1053  |
| LAFAYETTE AVE               | 1347  |
| LIVINGSTON ST               | 1653  |
| MANCHESTER PL               | 1251  |
| PO BOX                      | 0074  |
| POOLEY PL                   | 1128  |
| POTOMAC AVE                 | 1146  |
| PUTNAM ST                   | 1650  |

Delivery Point Code: 14213165374 - Word Recognition (Street Name) And Delivery Point Code Derivation

Automated Handwritten  
Address Interpretation



Remote Computer  
Reader (RCR) Software

"A lexicon driven approach to handwritten word recognition for real-time applications",  
 IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 19, No. 4, pp. 366-379, 1997

# SME Application Area 1: Automating routine tasks

- Significant time dealing with day-to-day tasks.
- AI tools can handle many routine activities.
- Examples include:
  - transcribing calls: Otter and Wingman transcribe conversations.
  - diary management: Motion and Akiflow use AI to build optimum daily schedules.
  - email inbox management: Leivity can help to keep your inbox organised.
  - accounting and finance: AI can create invoices, analyse financial data, and collate expenses.
  - data entry: Docuf.AI and AutoExtract.ai automate inputting data in documents.

## The state of business automation



**94%**

of workers say they perform repetitive, time-consuming tasks in their role



**9 out of 10**

knowledge workers say that automation has improved people's lives in the workplace



**88%**

of SMBs say automation allows their company to compete with larger companies



**2 out of 3**

knowledge workers say automation has helped them be more productive at work



**65%**

of knowledge workers are less stressed at work because they automate manual tasks

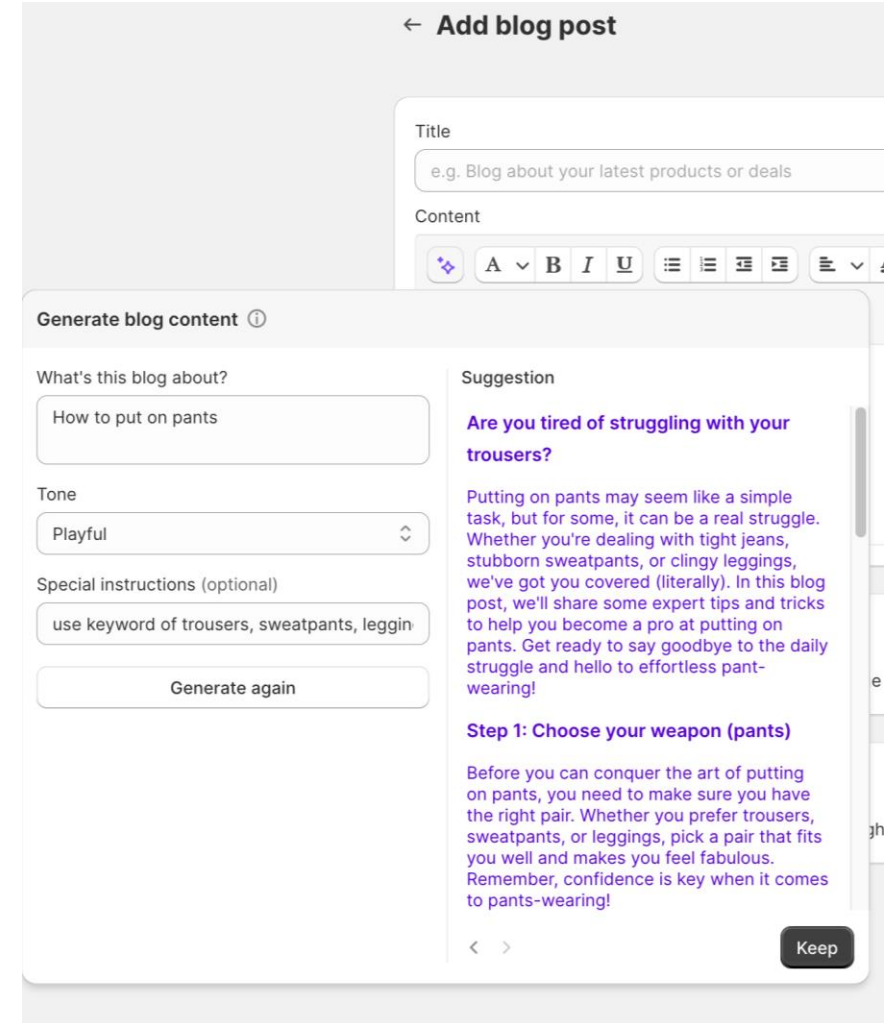


**Two-thirds**

of knowledge workers would recommend automation to other businesses

# SME Application Area 2: Generating and improving content with AI

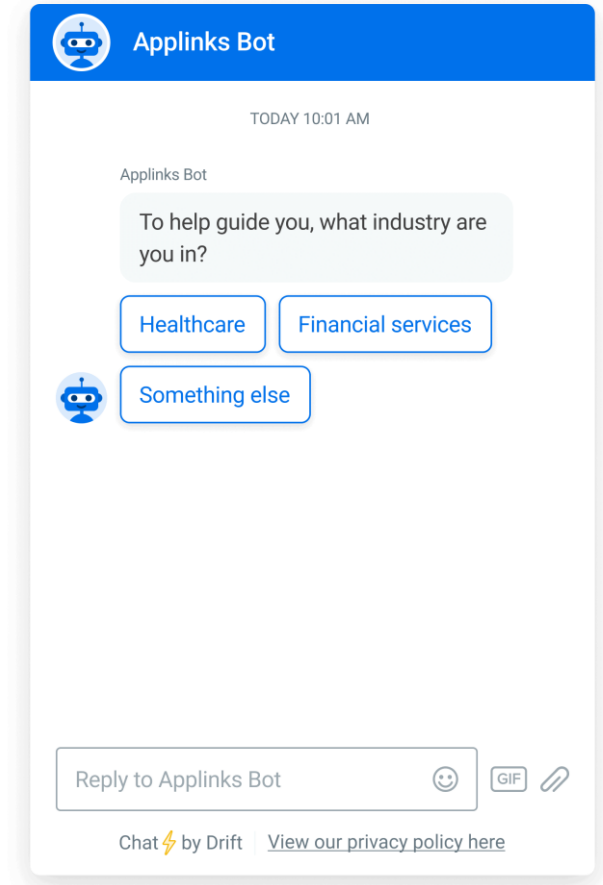
- Business owners may be required to create significant content for marketing and other communications.
- This includes writing blog posts, search engine optimisation copy, building emails, and creating images.
- These tasks can be tackled using AI.
- Tools like ChatGPT can generate content or suggest topics by analysing your audiences' interests.
- There are also solutions for:
  - researching and writing SEO copy
  - highlighting grammar and spelling errors
  - adjusting writing style and tone
  - generating images from text.



The screenshot shows a 'Add blog post' interface. At the top, there's a title field with the placeholder 'e.g. Blog about your latest products or deals'. Below it is a content editor with a rich text toolbar. A 'Generate blog content' panel is open, showing a text input field with 'How to put on pants', a tone dropdown set to 'Playful', and a 'Special instructions (optional)' field containing 'use keyword of trousers, sweatpants, leggin'. A 'Generate again' button is at the bottom of this panel. To the right, a 'Suggestion' panel displays a generated title: 'Are you tired of struggling with your trousers?' followed by a paragraph of text. Below the suggestion is a 'Step 1: Choose your weapon (pants)' section with another paragraph of text. A 'Keep' button is visible at the bottom right of the suggestion panel.

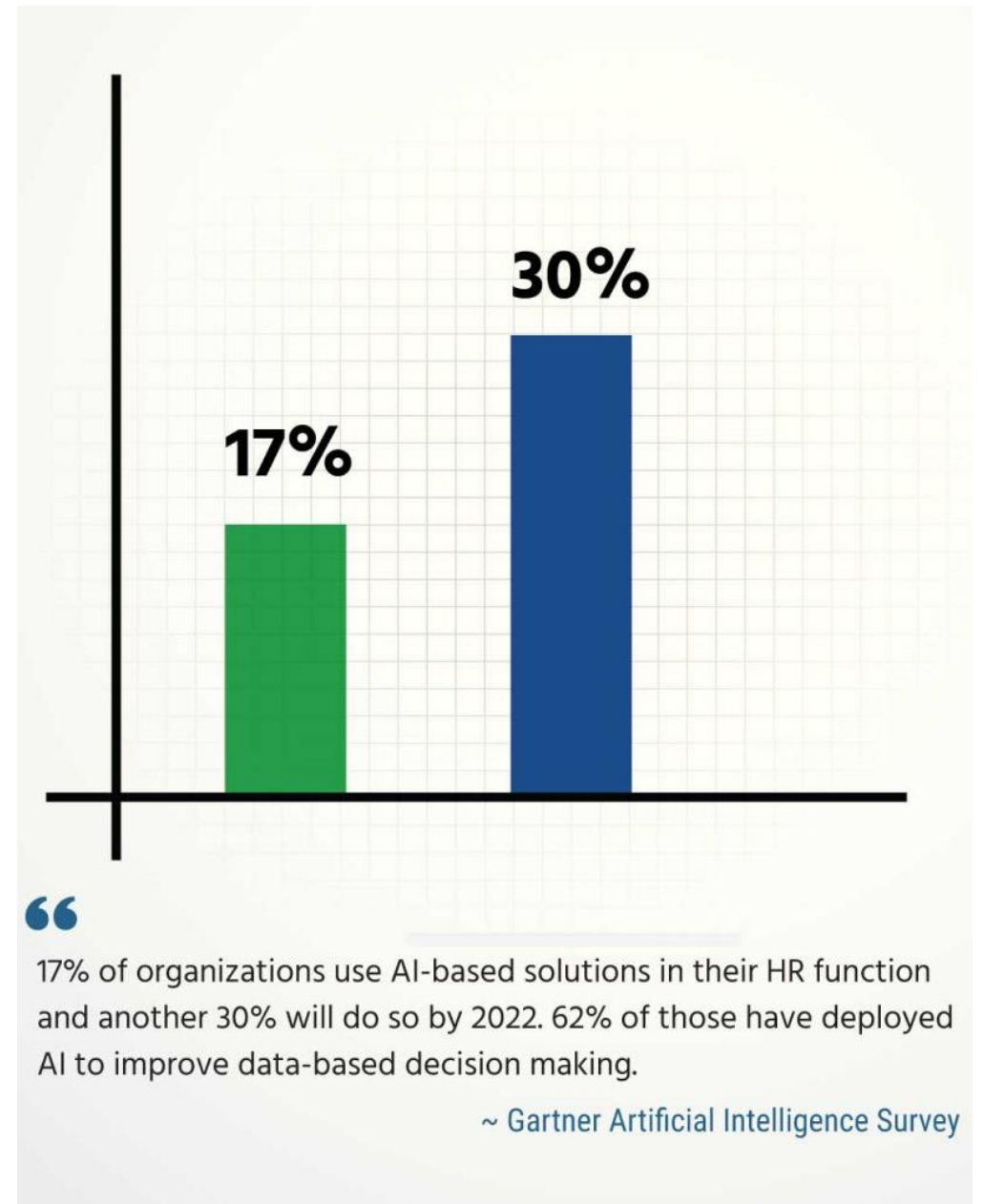
# SME Application Area 3: Using AI for customer communications

- AI can achieve a 3.5 times increase in customer satisfaction.
- Most common AI is customer service chatbots,
  - Freshchat, Happy Fox, Kustomer, can handle routine questions.
  - Relieves pressure on humans and deals with everyday issues.
  - Can act as a triage service, so questions that the chatbot can't answer are automatically sent to an agent.
- Other customer communication benefits of AI include predicting behaviour so that the business can offer a more personalised service.



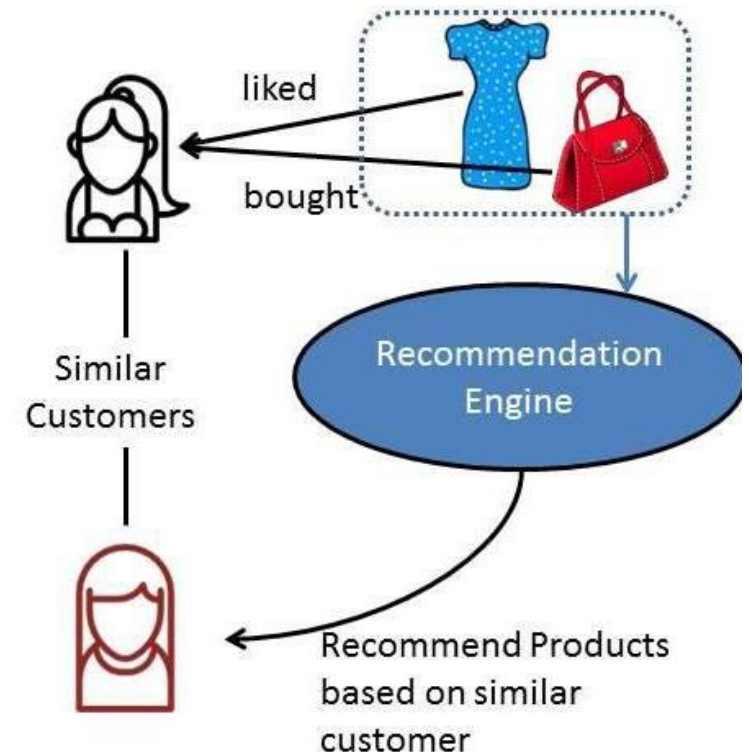
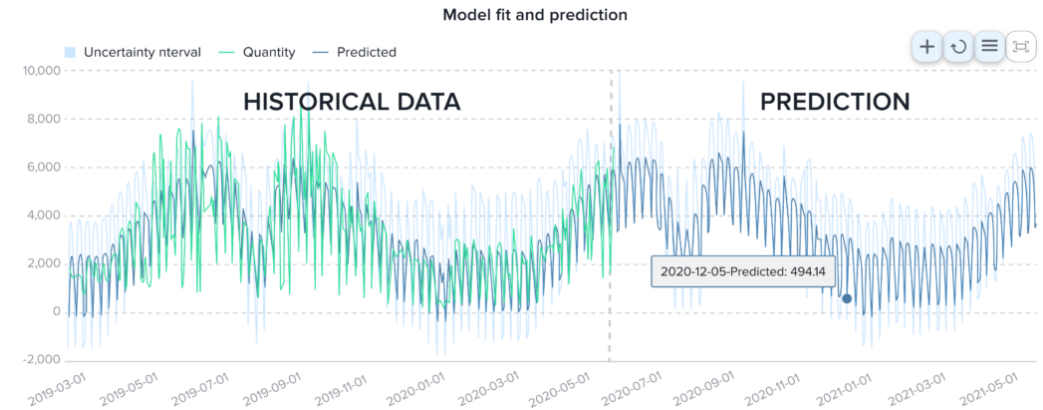
# SME Application Area 4: HR and recruitment

- Managing a workforce and recruiting new employees takes time - AI could help
- Features include:
  - writing job advertisements and descriptions
  - targeting relevant job candidates via social media platforms such as LinkedIn
  - analysing CVs to identify the best candidates
  - automating onboarding processes for new employees
  - automating training and personal development.

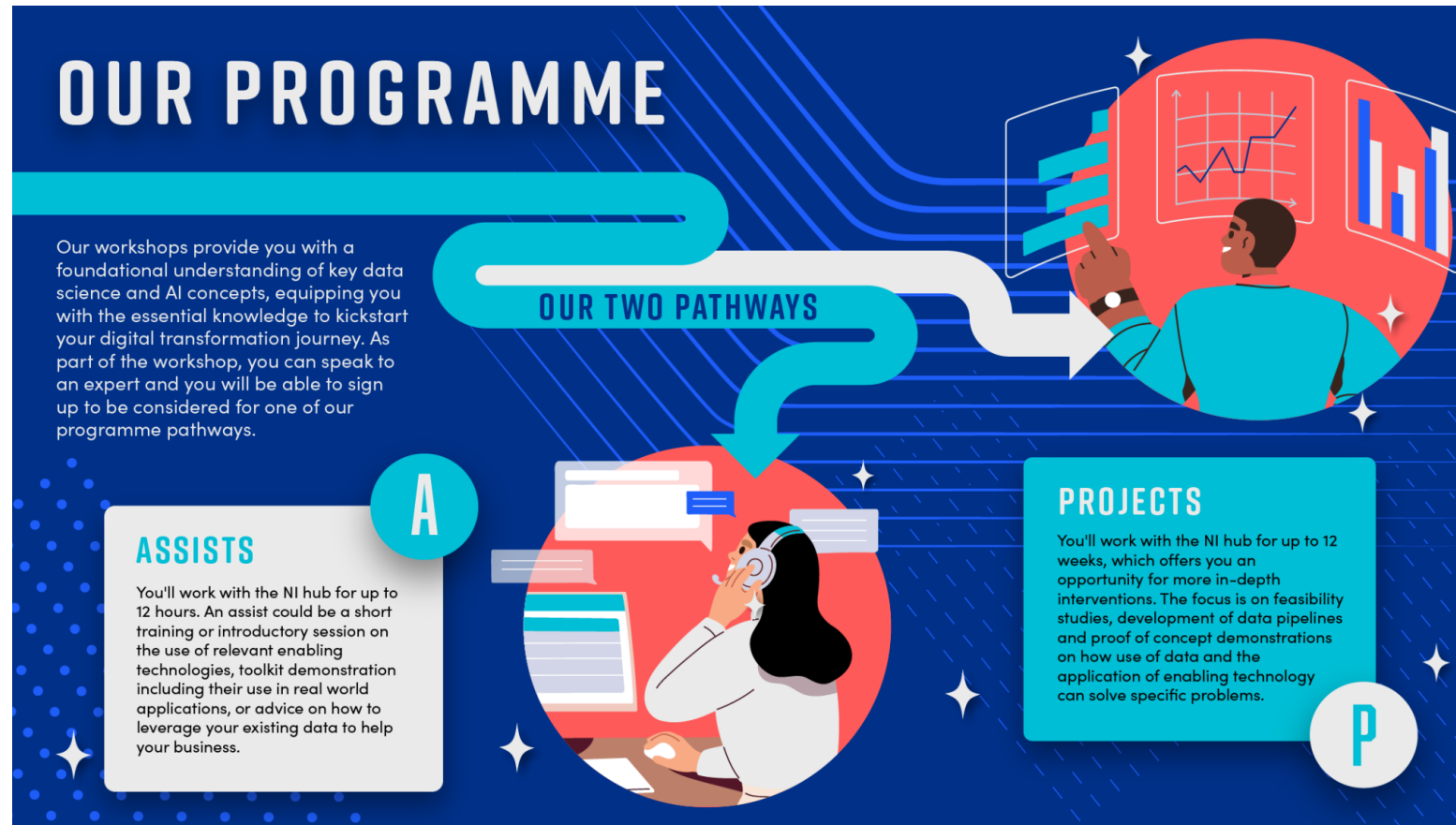


# SME Application Area 5: Analytics

- Leveraging data can be difficult.
- AI tools quickly analyse data.
- Examples of AI data analysis include:
  - segmenting customers into groups based on behaviour and other demographics to improve marketing and other messages
  - predicting future sales and trends, and demands to help businesses manage their inventory
  - personalising a customer's journey based on their behaviour and making recommendations for future purchases.



# How to get started with AI?





Science and  
Technology  
Facilities Council

Hartree Centre | Northern Ireland Hub

# Hartree NI Hub

# Hartree Centre for Digital Innovation

Collaborative Programme with IBM

Funded through UK Research and Innovation

Enabling UK businesses to explore and adopt innovative new digital technologies such as:

- Artificial Intelligence (AI)
- Data analytics
- Quantum Computing
- Visual Computing
- Robotics and Automation



**UK Research  
and Innovation**

We work with the government to invest over £7 billion a year in research and innovation by partnering with academia and industry to make the impossible, possible. Through the UK's nine leading academic and industrial funding councils, we create **knowledge with impact.**



Science and  
Technology  
Facilities Council

Hartree Centre | Northern Ireland Hub

# Hartree NI Hub

The Hartree NI Hub provides targeted and accessible support for SMEs to improve their competitiveness and growth through the adoption of digital technologies.



# Hartree NI Hub: Directors



Dr Justin Quinn



Dr Dermot Kerr



Prof Sonya Coleman

# Hartree NI Hub: Team



Lorraine Lavery  
Programme Manager



Abi Adebayo  
Data Scientist



Jade Osinowo  
Data Scientist



Emma Logue  
Executive Assistant

# Mission

“Empower SMEs in Northern Ireland and support them in their digital transformation journey”

Support is **fully funded** and allows SMEs to access expertise around Artificial Intelligence (AI), Data Analytics, Visual Computing and more



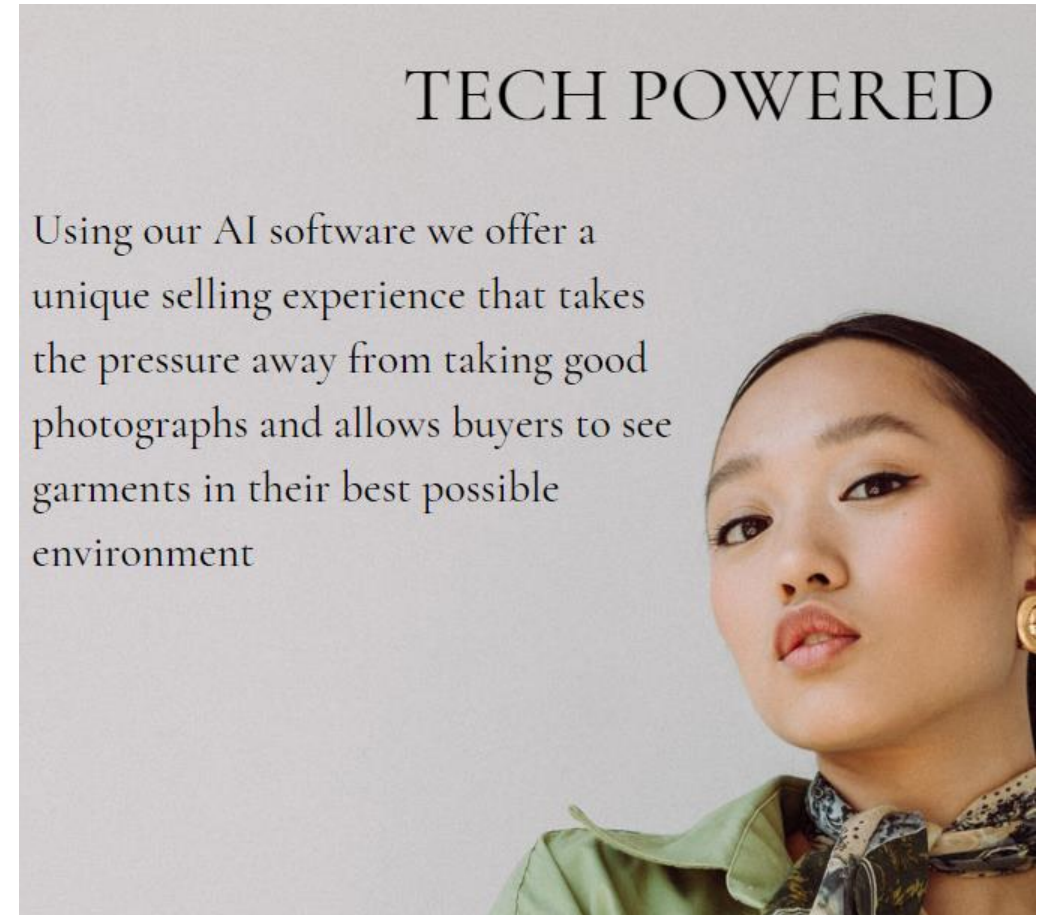
Science and  
Technology  
Facilities Council

Hartree Centre | Northern Ireland Hub

# Success Stories

# AI for Visual Merchandising

- **Challenge:** find a digital solution to help the pre-loved clothing industry to compete with fast fashion, first-hand clothing industry.
- **Solution:** take basic images of garments from sellers and put them onto a model in a stylised image that makes shopping second-hand feel like shopping new.
- **Benefits:** feasibility of virtual try on approaches were explored, allowing company to better understand the benefits and limitations.



# AI to Extract Road Lane Markings



- **Challenge:** to expand offering by utilising existing data from aerial images. The current manual extraction was time consuming and not scalable.
- **Solution:** model developed to automatically extract and label lane markings from aerial images.
- **Benefits:** automated, accurate, scalable solution. Next steps are to acquire more data to further develop the model.



# Surveying Bird Species using Geolocation

- **Challenge:** To determine if bird species identification might be possible from spatial patterning of birds.
- **Solution:** multiple machine learning models for identifying bird species were created using existing datasets.
- **Benefits:** the models demonstrated the viability of the approach. Team now have an understanding of the available datasets and gained knowledge around modelling.



**SEASCAPE**



Science and  
Technology  
Facilities Council

Hartree Centre | Northern Ireland Hub

# Programme Overview

# Engagement

- ❖ Workshops
- ❖ Assists
- ❖ Projects



# OUR PROGRAMME

Our workshops provide you with a foundational understanding of key data science and AI concepts, equipping you with the essential knowledge to kickstart your digital transformation journey. As part of the workshop, you can speak to an expert and you will be able to sign up to be considered for one of our programme pathways.

## OUR TWO PATHWAYS

### ASSISTS

You'll work with the NI hub for up to 12 hours. An assist could be a short training or introductory session on the use of relevant enabling technologies, toolkit demonstration including their use in real world applications, or advice on how to leverage your existing data to help your business.

A



### PROJECTS

You'll work with the NI hub for up to 12 weeks, which offers you an opportunity for more in-depth interventions. The focus is on feasibility studies, development of data pipelines and proof of concept demonstrations on how use of data and the application of enabling technology can solve specific problems.

P





## ASSISTS

You'll work with the NI hub for up to 12 hours. An assist could be a short training or introductory session on the use of relevant enabling technologies, toolkit demonstration including their use in real world applications, or advice on how to leverage your existing data to help your business.



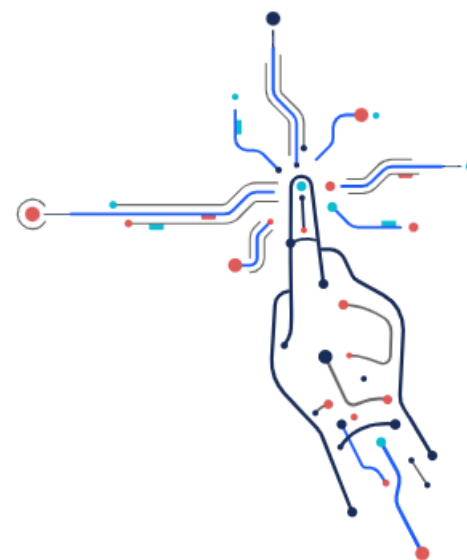
Science and  
Technology  
Facilities Council

Hartree Centre | Northern Ireland Hub

# PROJECTS

P

You'll work with the NI hub for up to 12 weeks, which offers you an opportunity for more in-depth interventions. The focus is on feasibility studies, development of data pipelines and proof of concept demonstrations on how use of data and the application of enabling technology can solve specific problems.



Science and  
Technology  
Facilities Council

Hartree Centre | Northern Ireland Hub

# What we will do

- Work with you to scope out your project and define your requirements via discovery sessions.
- Put a plan in place to complete the project within 12 weeks.
- All interventions will focus on the use of one or more enabling technologies.
- Both assists and projects will be free to SMEs at point of delivery.



# What you will do

- Dedicate a point of contact.
- Sign the User Agreement.
- Provide access to any necessary data / equipment for the project.
- Support the preparation of a case study.



# Working together

We are seeking companies in all sectors and at all levels of digitalisation to develop **impactful projects**, thereby increasing the innovation, productivity, and competitiveness across a range of SME sectors in Northern Ireland.



# How to Contact us

W: [www.hartreeni.uk](http://www.hartreeni.uk)

E: [info@hartreeni.uk](mailto:info@hartreeni.uk)

T: 02871 674 210

SCAN ME





Science and  
Technology  
Facilities Council

Hartree Centre | Northern Ireland Hub

# Shareit Biz



Science and  
Technology  
Facilities Council

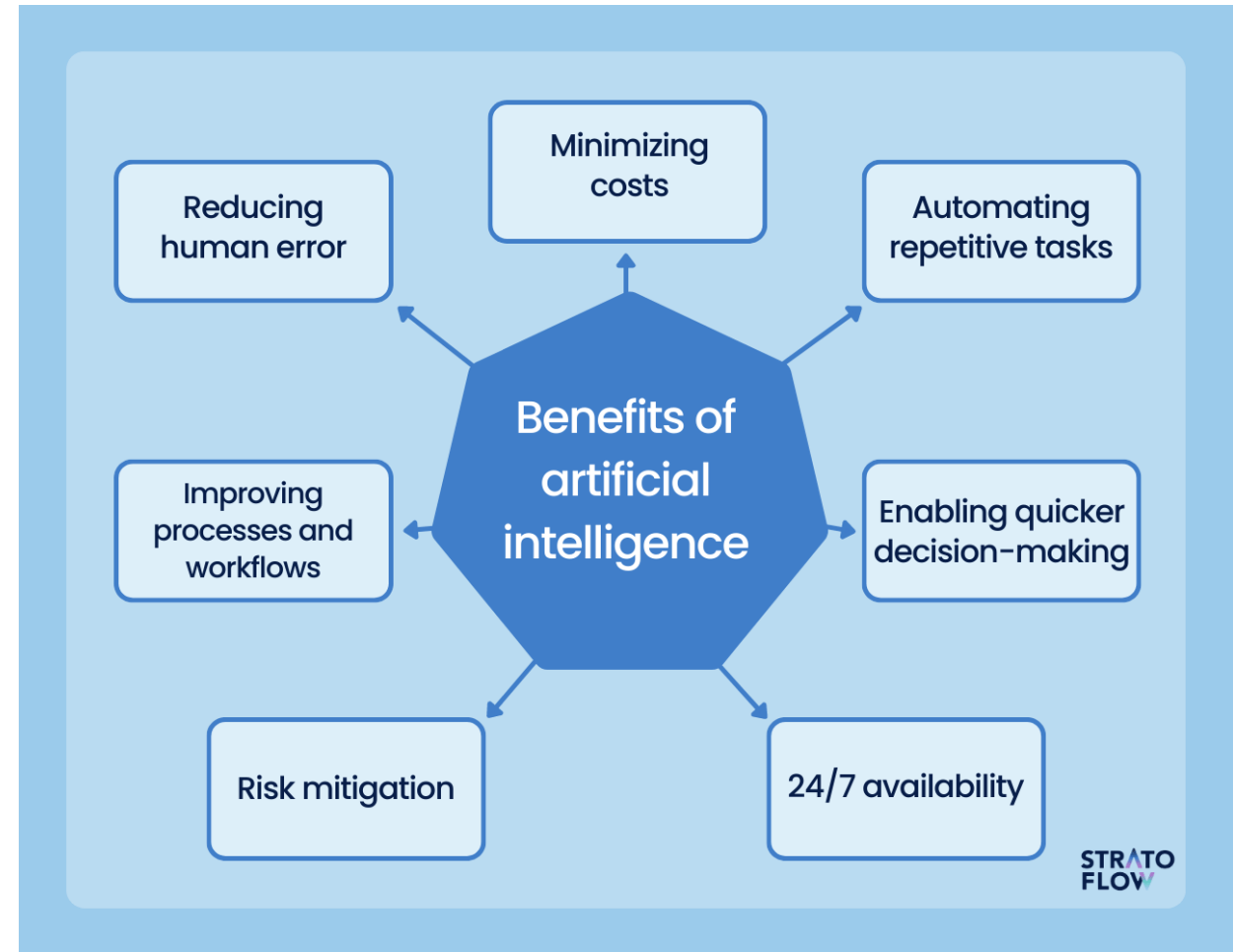
Hartree Centre | Northern Ireland Hub

# Workshop



# Workshop Aims

- Illustrate AI capability
- Stimulate thinking around AI
- Generate questions
- Ideation for solutions for you



# Coffee Shop / Restaurant Example

- Scenario – Small Coffee Shop Owner– Independent



- People come in and out
- Some sit in some take away
- Relatively short/small menu
- Placed in busy high street
- Small casual staff contingent

# Coffee Shop / Restaurant Example

- Owner – What do I wonder??
- (Take 10 mins to write down as many as you can think of)
  - What happens in my shop
  - How many covers do I have per day
  - Is everything in the correct place?
  - Who comes in every day and buys the same thing
  - What is the rate of service over the period of the day
  - What's my most popular product
  - How long does it take for product to sell out
  - Who buys what on a sunny day/windy day/ cold day
  - What do my workers do
  - How far do they walk in a day
  - Who's the best worker
  - What metric are best to measure
  - How long do my customers wait
  - How long to prepare and deliver an order



# Your Business

- What questions do you have in your business – take some time to work with your table and input answers



# Menti Results

- Online Results



# Coffee Shop Solution



This coffee shop employs object detection and recognition technology using CCTV footage to monitor and optimize the productivity of its baristas and the duration customers spend inside the establishment.

# Coffee Shop Example



What information do you think you can get from the video ??

Take time with your table to suggest results



# Menti Results

- Online Results



# Coffee Shop Example

## How can AI improve the productivity in coffee shops?

**This coffee shop employs object detection and recognition technology using CCTV footage to monitor and optimize the productivity of its baristas and the duration customers spend inside the establishment.** Through this system, the coffee shop can precisely track each customer's dwell time and evaluate the efficiency of its baristas, facilitating data-driven insights and improvements in service quality.



### **1. Customer Wait Time Optimization:-**

AI can analyze CCTV footage to track the movement of customers in real-time. By identifying queues and wait times at the counter, the system can alert baristas when the number of customers waiting is high, prompting them to prepare orders more efficiently.

**2. Barista Productivity Monitoring:-** AI can track the actions of baristas by recognizing their movements, such as when they start preparing an order, complete an order, or restock supplies. This data can be used to assess their productivity, identify bottlenecks, and provide performance feedback.

# Coffee Shop Example

**5. Real-time Alerts:-** When queues become too long or customer wait times exceed a certain threshold, the AI system can send real-time alerts to baristas or management, enabling them to take immediate action, such as opening additional registers or expediting orders.

**6. Menu Recommendations:-** By tracking customer behavior and preferences, AI can provide personalized menu recommendations on digital displays or mobile apps. This can encourage customers to make quicker decisions, reducing order times.

**7. Quality Control:-** AI can monitor baristas' actions to ensure they are following the correct procedures for making coffee. It can identify deviations from standard practices and provide guidance for consistent quality.

**8. Feedback Loop:-** Customer feedback can be integrated into the AI system. If customers express dissatisfaction with wait times, the system can analyze the corresponding CCTV footage to identify areas for improvement.

**9. Inventory Management:-** Object detection can be extended to track inventory levels in real-time. When supplies run low, the system can automatically generate restocking alerts, ensuring that baristas always have the necessary ingredients and materials.

**10. Trend Analysis:-** AI can analyze historical data to identify trends in customer behavior, helping the coffee shop anticipate seasonal changes in demand, special promotions, or menu preferences.



# A few examples

- **Solicitor Business**

- Document Analysis and Review
- Legal Research
- Contract Management
- Predictive Analytics for Case Outcomes
- Virtual Legal Assistants

- **Accountancy Business**

- Automated Data Entry and Bookkeeping
- Fraud Detection and Risk Assessment
- Financial Forecasting and Predictive Analytics
- Tax Compliance and Optimization
- Client Relationship Management (CRM)

- **Graphic Design Business**

- Automated Design Generation
- Image Editing and Enhancement
- Predictive Design Analytics
- Personalized Design Recommendations

- **Health Technology**

- Medical Imaging Analysis:
- Drug Discovery and Development
- Remote Patient Monitoring
- Personalized Medicine and Treatment Planning
- Healthcare Operations Optimization

- **Horticulture / Farm**

- Crop Monitoring and Management
- Precision Agriculture
- Predictive Analytics for Yield Forecasting
- Weed and Pest Detection
- Crop Breeding and Genetic Analysis

- **Engineering**

- Design Optimization
- Predictive Maintenance
- Process Automation
- Quality Control and Inspection
- Supply Chain Optimization

Your Business – Take your post it notes and fill in your ideas

What do I want to know – follow the ideas we have covered and be adventurous

How do I start



SCAN ME

