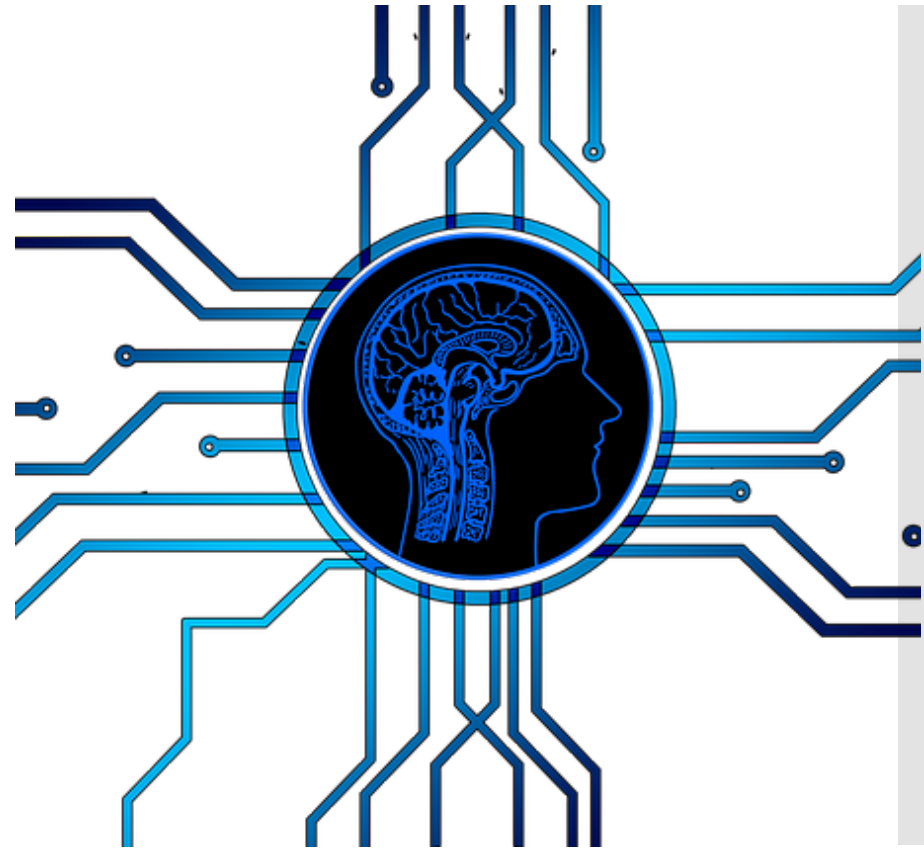


# What Is AI?

A Quick Introduction

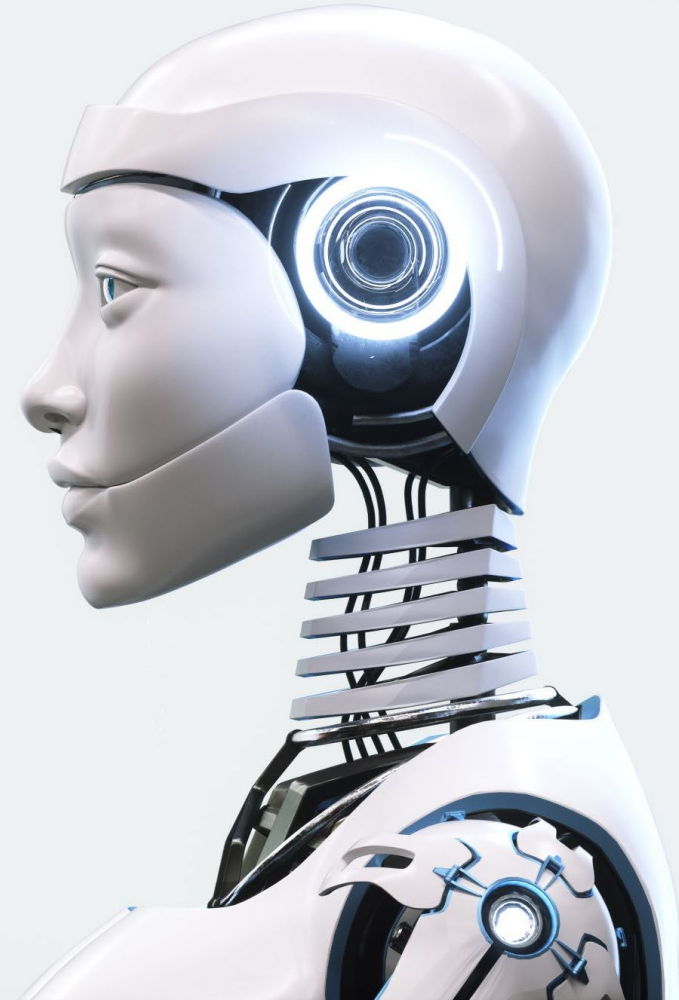


# Intelligence is best seen as...

*"A way to model the world to discover robust and reliable short-cuts"*

- It does not mean that you are guaranteed a better outcome.
- It does not mean you can always exploit these short-cuts
- It does not mean the model you use can't miss an important factor
- It does not guarantee you can legally apply these short-cuts
- It does not ensure that you will retain this advantage
- It does not guarantee competitor advantage

**But what is clear is that without intelligence we cannot see new opportunities because the problems in front of us will appear complex**



# Artificial Intelligence is best seen as...

- A collection of techniques that have been applied to data to try to extract models of the real world and **shortcuts with minimal human intervention**
  - These also make no guarantees and are fraught with potential unintended consequences.
- In practical matters for AI, the techniques themselves define the type of models and shortcuts we can get from the world.
  - Programmable AI (Expert systems, Natural language processing, Vision etc...)
  - Machine Learning (ML): statistical techniques to give computers the ability to learn with data. It can further be categorized into supervised learning, unsupervised learning, semi-supervised learning, and reinforcement learning.
  - And specialised new areas that combine techniques such as LLMs, GANs

# AI Special Areas

## **LLMs or Natural language processing large language models:**

GPT-3 or 4, LaMDA, PaLM, LLaMA (or OpenAI/Microsoft, Google, Anthropic, Meta, etc..)

- Advanced deep learning models trained on large datasets of text and code.
- LLM models have diverse applications including text generation, translation, and question answering, and they are still being developed to improve their capabilities.
- LLM models have the potential to revolutionize human-computer interaction and how we interact with computers.

## **Generative AI: Generative adversarial networks (GANs), Variational autoencoders (VAEs)**

- GANs have been used to produce an explosion of “creative tools” that bring the learning from large libraries of annotated image data into the hands of the creator.
- Translating a video to a cartoon, or a sketch into a realistic image, magically erasing details, etc... This is moving into CAD, 3D data, engineering etc.

## **Computer vision: Object detection, Image segmentation, Face recognition, Medical imaging**

- Automated vision systems powered by computer vision algorithms can outperform humans in certain domains, making them a reliable source of automated detected data through camera feeds and other sources.

What is so special  
about this  
LLMs/GANs/CVision?



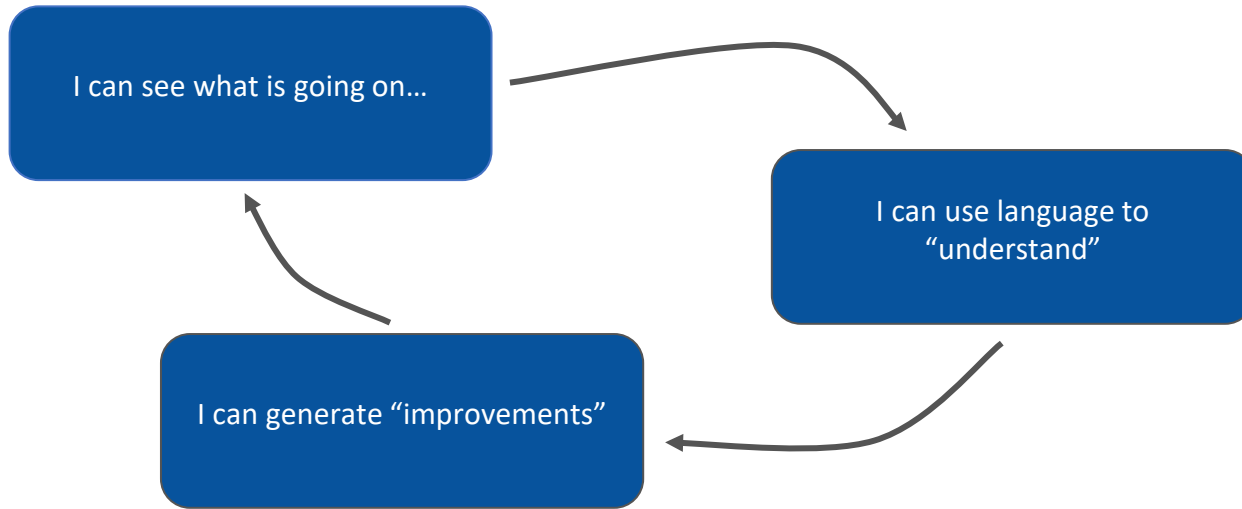
Humans use language for everything from communication, to reasoning, planning, documentation, sharing knowledge, making decisions, solving problems.  
**And LLM's nearly "crack" human language...**



Human value of intellectual activity is based on legal frameworks loosely based on copyright.  
**And GANs nearly "crack" copyright...**



Humans have been essential in understanding what is happening in a scene with reliability and accuracy.  
**And novel Computer Vision work nearly "cracks" collecting data automatically...**



Super-simplified model

# Key Issues with AI

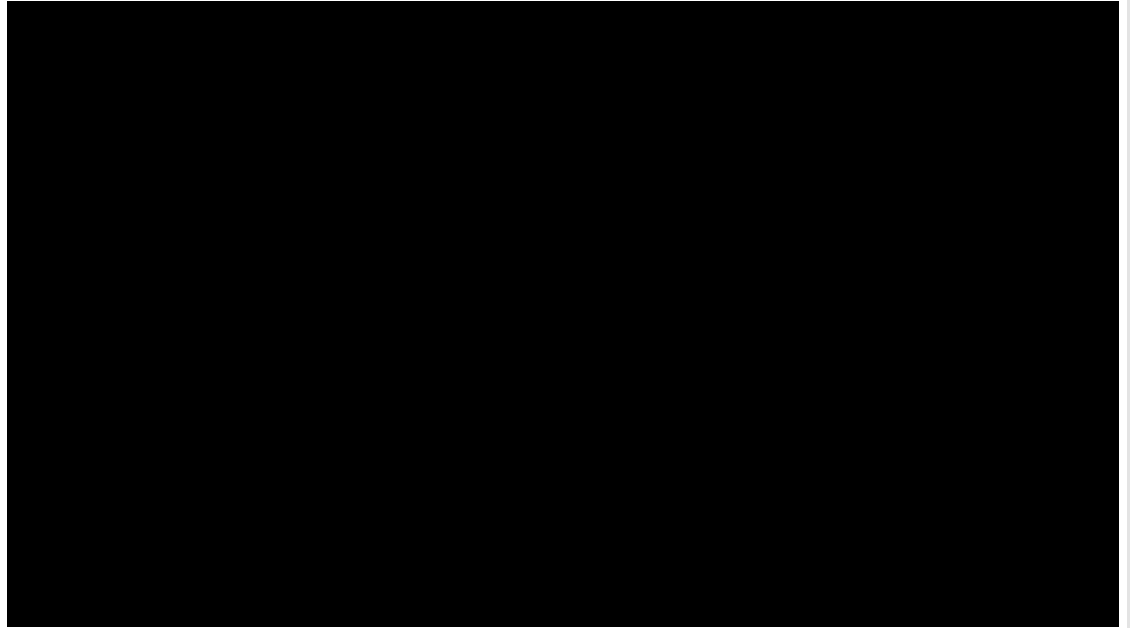
AI &  
Construction:  
Just follow  
the data...





- **Building Information Modeling (BIM):** AI analyzes BIM data for predicting project outcomes, optimizing designs, and improving decision making using 3D models, project specifications, and cost data.
- **Generative Design:** AI algorithms generate multiple design alternatives based on predefined parameters using historical design data, material properties, and design codes and standards.
- **Predictive Analytics:** AI predicts project delays, cost overruns, and potential issues by analyzing historical and ongoing project data, such as schedule, cost, resource allocation, and scope changes.
- **Risk Management:** AI identifies potential risks in projects based on patterns from past projects, utilizing previous outcomes, risk registers, and project performance data.
- **Robotic Process Automation (RPA):** AI-guided robots automate repetitive tasks like bricklaying and concrete dispensing, leveraging CAD designs, worksite data, and sensor data from the robots.
- **Quality Control:** Computer Vision AI analyzes construction site images and videos to identify errors or deviations from plans using site surveillance data, drone footage, and inspection reports.
- **Safety Monitoring:** AI algorithms identify safety hazards in real-time by analyzing site images, videos, CCTV feeds, helmet-cam data, and safety incident reports.
- **Regulatory Compliance:** AI analyzes project documentation and data to ensure regulatory compliance by examining project reports, inspection logs, and regulation databases.
- **Predictive Maintenance:** AI predicts equipment failure and schedules maintenance tasks by analyzing data from IoT devices embedded in machinery, including sensor data, maintenance records, and machine specifications.
- **Energy Efficiency:** AI optimizes building energy use by analyzing historical and real-time energy consumption data, weather data, and building occupancy data to enhance energy efficiency.

# V.I.C.T.O.R Solution



# TRAMS CONSTRUCT PROJECT



***Our objective is to embed Artificial Intelligence in a Trustworthy and Responsible Manner.***

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TRAMS-CONSTRUCT is an Innovate UK Funded Project that aims to bridge the gap between AI and Construction.

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Our objective is to create a platform that collects and preprocesses on-site data from construction contractors managing large sites.

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It focuses on enabling Trustworthy and Responsible Artificial Intelligence (AI) and Machine Learning (ML) technologies to address challenges faced by construction contractors on large sites.

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The project emphasizes priority use cases such as productivity improvement, smart contracts, and dispute resolution.

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The platform targets contractors who are seeking third-party digital solutions to enhance productivity.

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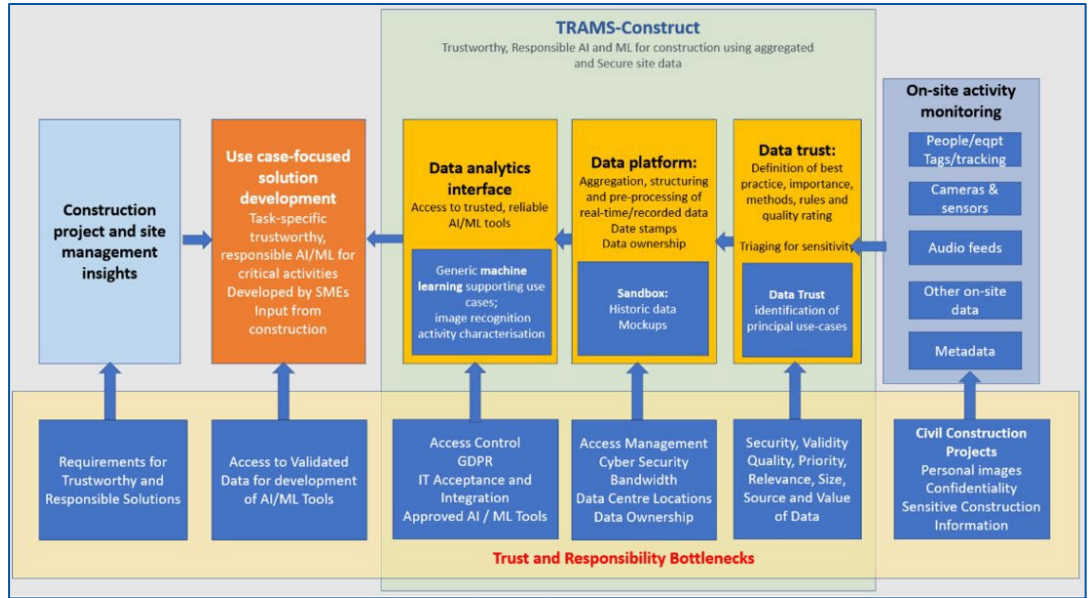
It facilitates the development and implementation of trustworthy and responsible Artificial Intelligence (AI) and Machine Learning (ML) technologies.

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End users can utilize the platform to conduct targeted analysis of multiple on-site construction monitoring data feeds, catering to various use cases.



# TRUSTWORTHY, RESPONSIBLE AI/ML FOR CONSTRUCTION USING AGGREGATED AND SECURE SITE DATA



*By addressing these bottlenecks, we provide a solution to the construction industry whilst also considering the ethical challenges surrounding the trustworthiness of AI.*