

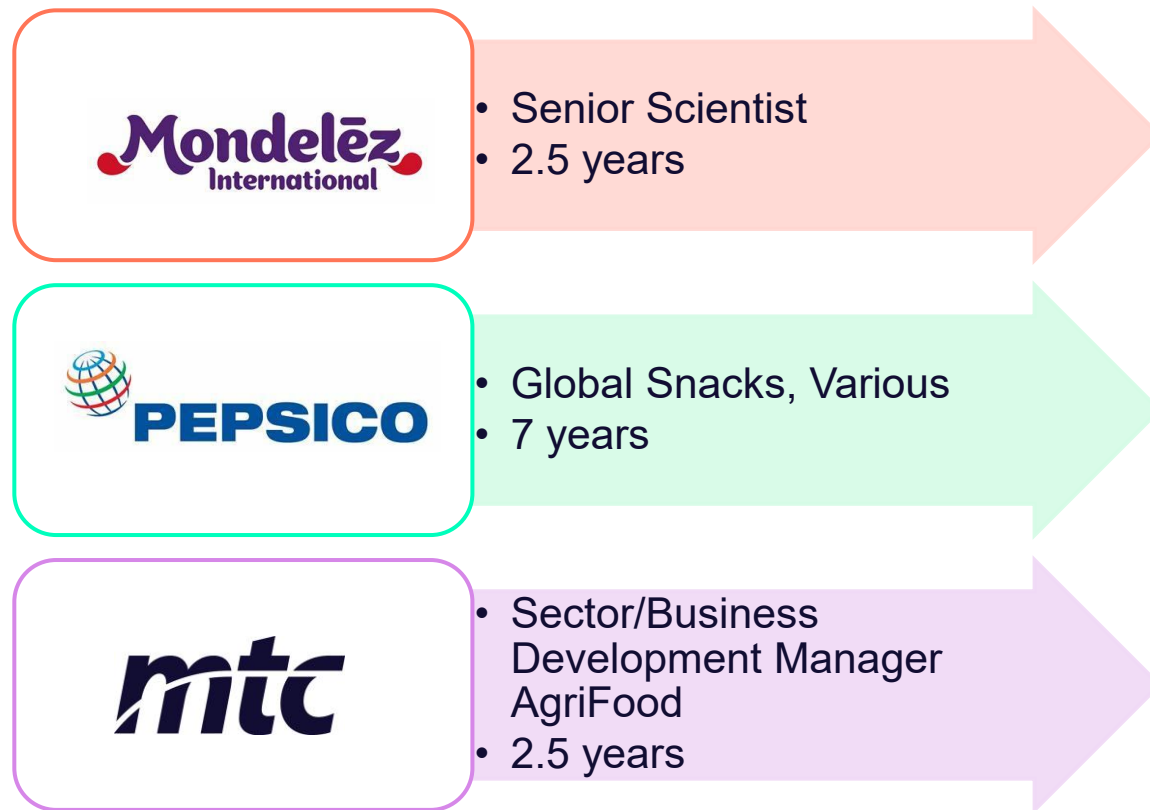
AI IN MANUFACTURING

Opportunities And Barriers To Adoption

Dr Bhavnita Patel

23/07/25

Introduction



Bhavnita Patel

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Collaborate with industry leaders, trade organisations, and government agencies to drive technological innovation and progress in the Agri-tech and Food & Drink Manufacturing sectors.

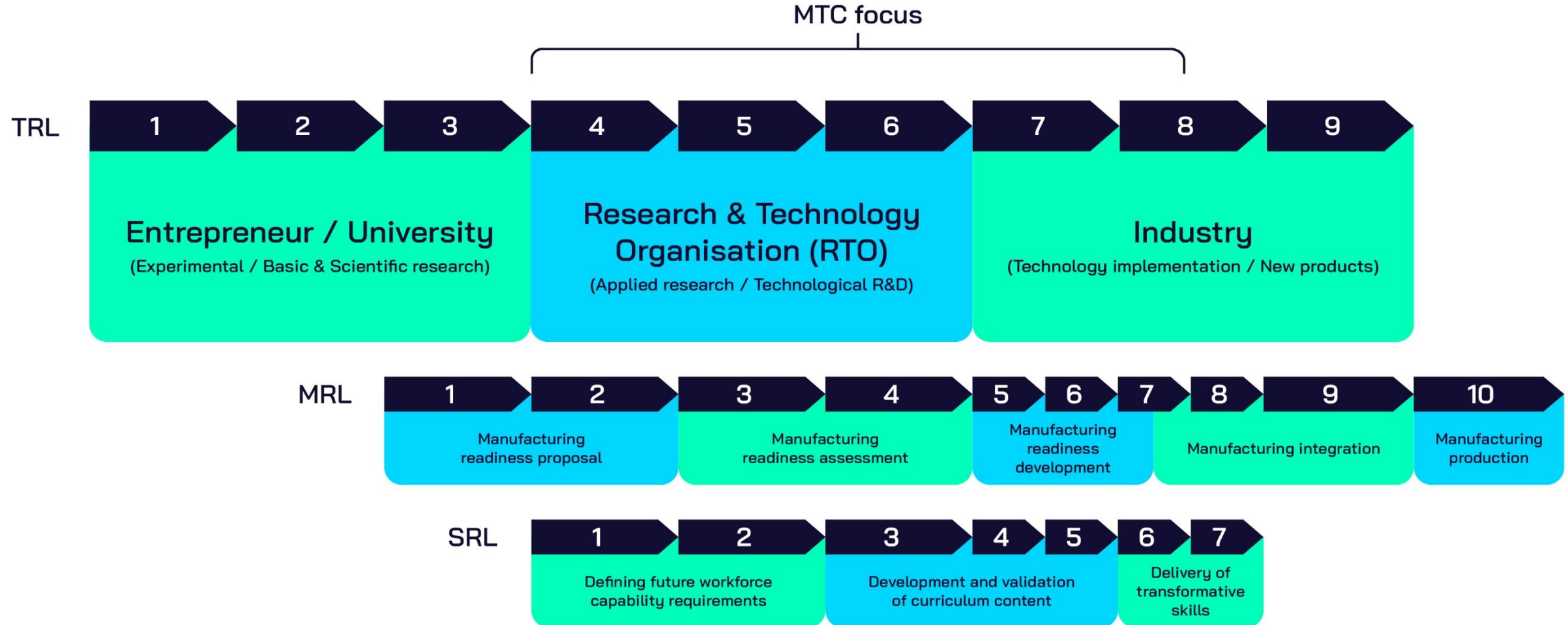
About us

Our purpose

To harness the power of our pioneering mindset and engineering excellence to positively impact society

- + Independent Research Technology Organisation (RTO)
- + Opened in 2011
- + Opened training facility in 2015
- + £120 million+ in turnover
- + 1000+ staff members over 600 engineers & 100 apprentices

Bridging the valley of death



TRL = Technology readiness level

MRL = Manufacturing readiness level

SRL = Skills readiness level

AI Potential

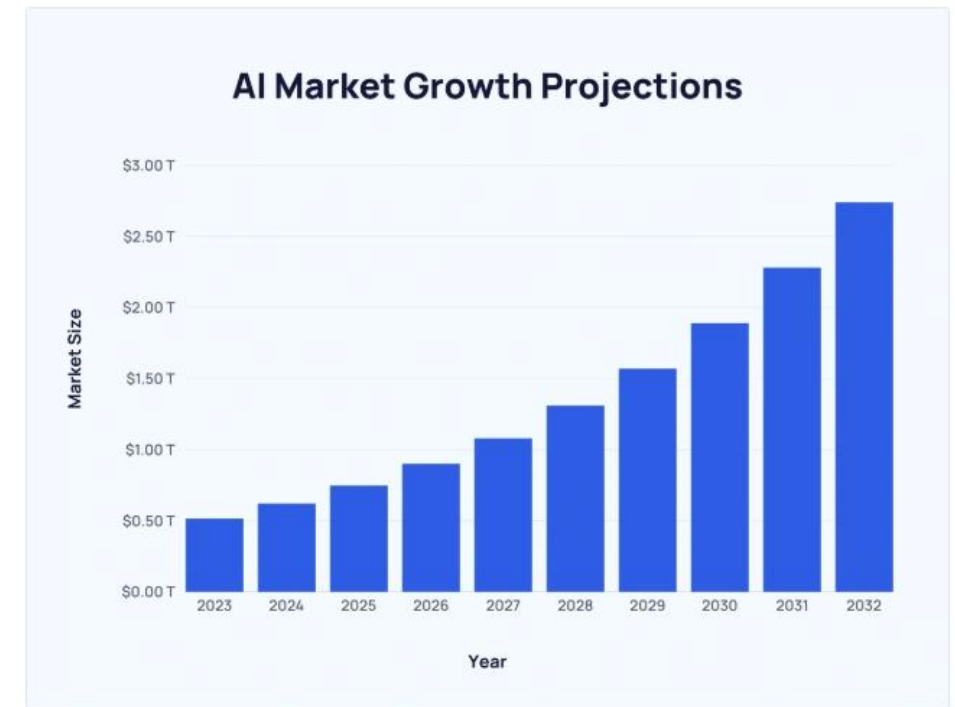
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THE POTENTIALS OF AI

Artificial Intelligence (AI) is the simulation of human intelligence in machines programmed to think, learn, and problem-solve.

- + The global market size for AI in manufacturing was \$5 billion in 2023 and is forecast to reach \$68 billion by 2032.¹
- + AI-enabled predictive maintenance could reduce maintenance costs by up to 30% and unplanned downtime by 45%.²
- + AI implementation in manufacturing processes can lead to cost reductions of up to 30%.³
- + AI technologies can automate tasks that absorb between 60% and 70% of workers' time today.⁴



<https://explodingtopics.com/blog/ai-market-size-stats>

- <https://www.precedenceresearch.com/artificial-intelligence-in-manufacturing-market>
- <https://www.pwc.in/research-and-insights-hub/immersive-outlook-5/using-artificial-intelligence-to-fast-track-manufacturing-operations.html>
- http://chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www3.weforum.org/docs/WEF_AI_in_Manufacturing_2022.pdf
- <https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier#introduction>
- <https://www.factsparn.com/blogs/advanced-supply-chain-management-with-ai-and-ml/>

THE UK INDUSTRIAL AND AI STRATEGY

- “The gains from AI innovation alone could add up to **£47 billion a year** for the UK in productivity gains over the next decade.” Industrial Strategy, Page 54
- “Establish a new Sovereign AI Unit within government, with up to **£500 million....**” Industrial Strategy, Page 57
- “...technical and delivery resource to build and test proof of concepts, leveraging in-house AI expertise, together with specialists....” AI Opportunities action plan, Section 2, Point 35
- “...We must be an **AI maker**, not just an AI taker.” AI Opportunities action plan, Section 3
- “Delivering our AI vision for Britain requires lots of hard work, some tough choices, and a commitment to **real partnership between public and private sectors.**” AI Opportunities action plan, Foreword



- https://assets.publishing.service.gov.uk/media/68595e56db8e139f95652dc6/industrial_strategy_policy_paper.pdf
- <https://www.gov.uk/government/publications/ai-opportunities-action-plan/ai-opportunities-action-plan#secure-future>

Barriers to AI Adoption

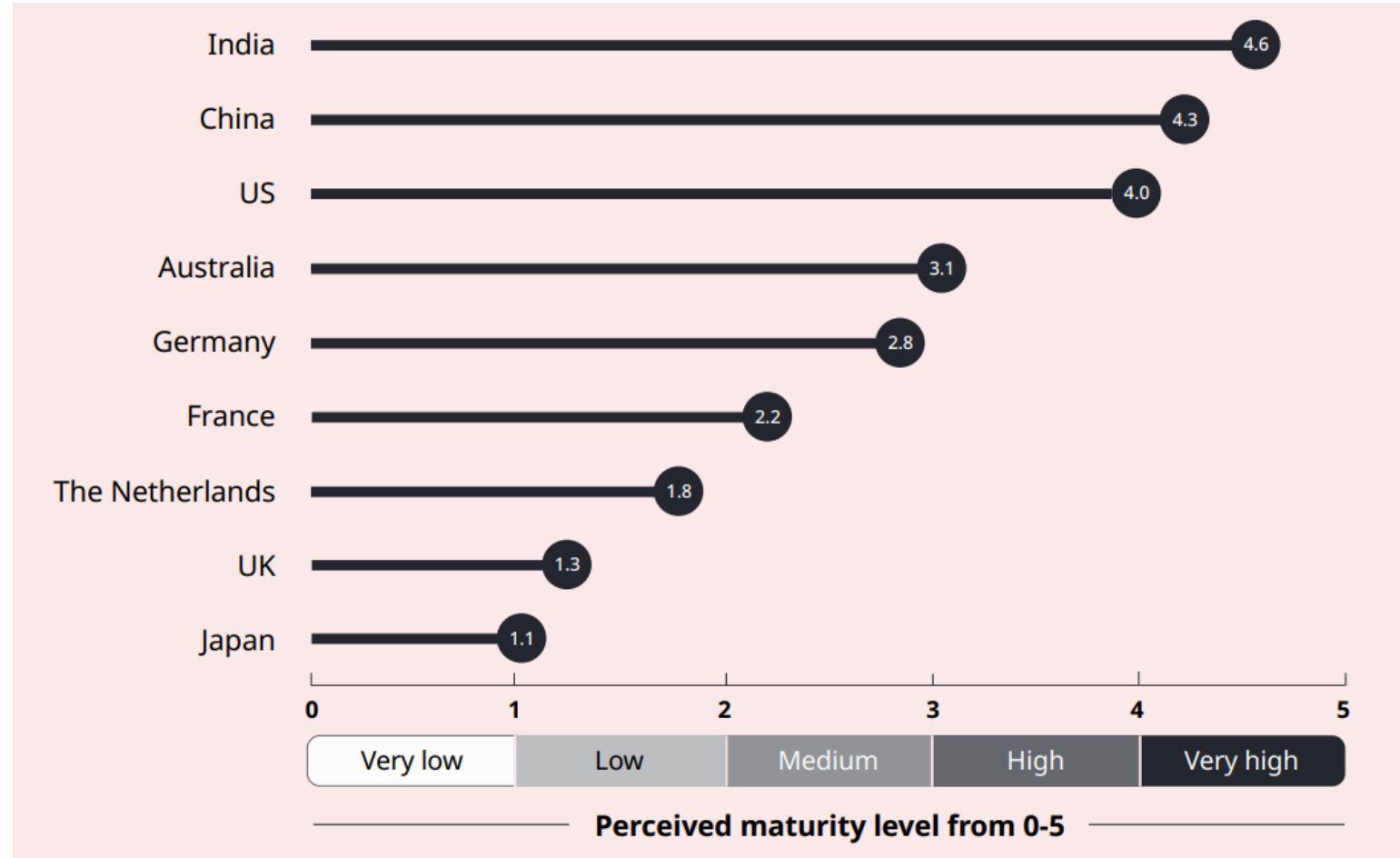


Stagnant Adoption

BSI study on AI maturity

UK holds a low AI maturity score compared to other countries.

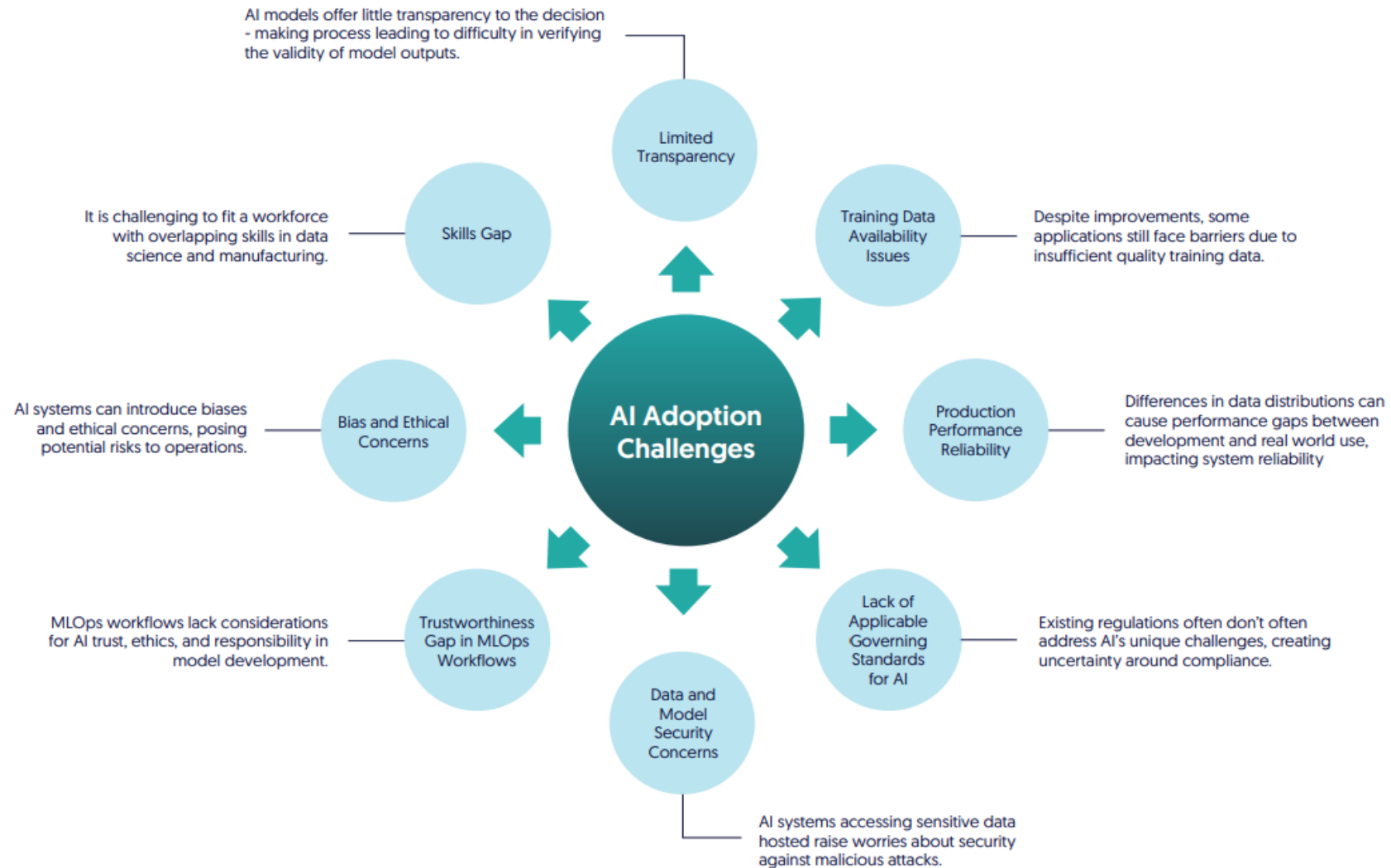
- + Low **confidence** levels in AI technology.
- + Low **adoption rate** into industry.
- + Little **trust** in AI technology.



BSI's International AI Maturity Model Aggregate scores across 15 different categories, including investment, training, trust and communications.

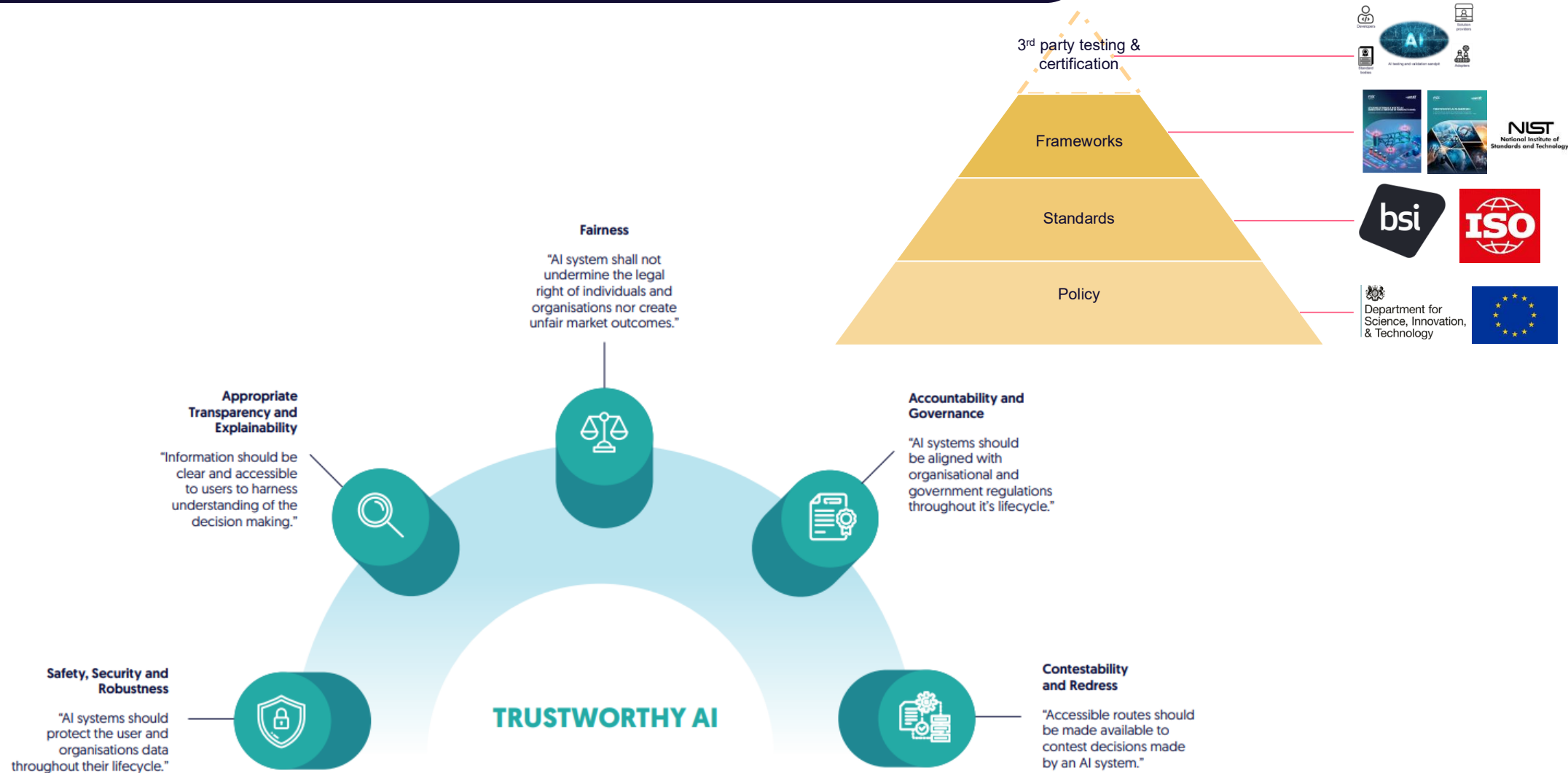
Source: <https://www.bsigroup.com/siteassets/pdf/en/insights-and-media/campaigns/trust-in-ai.pdf>

Challenges & Blockers



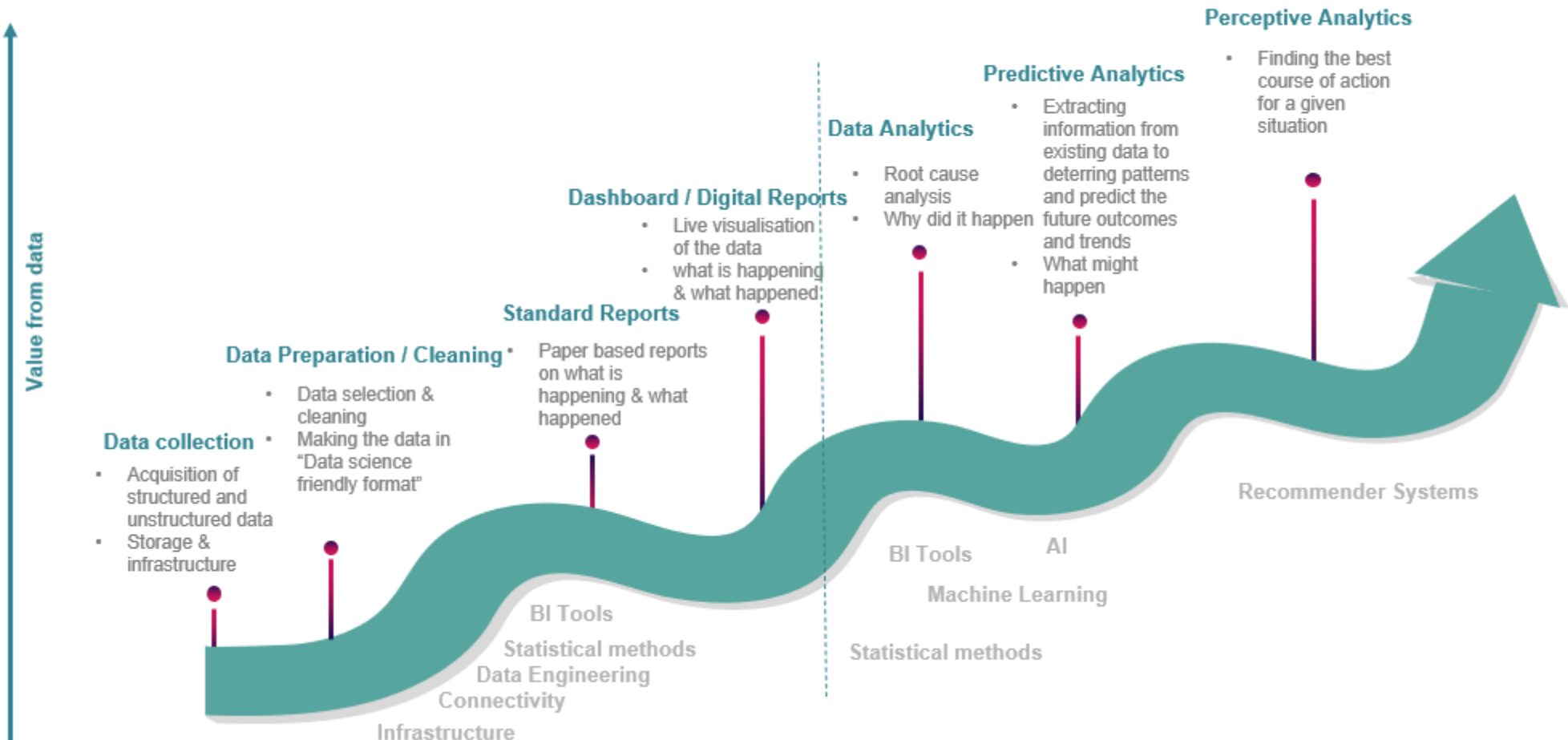
Challenges of AI adoption as expressed by industry.

Solutions - Trustworthy AI



The key principles of trustworthy AI.

Value From Data, Where To Start



AI Adoption



Strategic
implementation
roadmap

- Build a Long-Term AI Strategy
- Identify Use Cases
- Fail-Fast PoC Projects and Measure ROI
- Start Small and Scale Gradually



Digital
infrastructure

- Organisational Digital Infrastructure
- Digital Data Collection and Storage
- System Integration and IoT
- Cybersecurity and Compliance



Skills and
competency

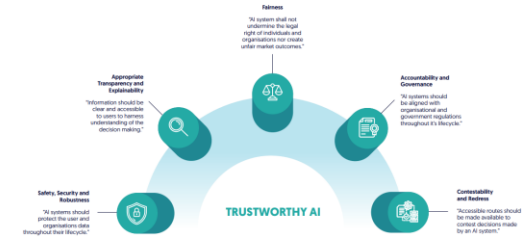
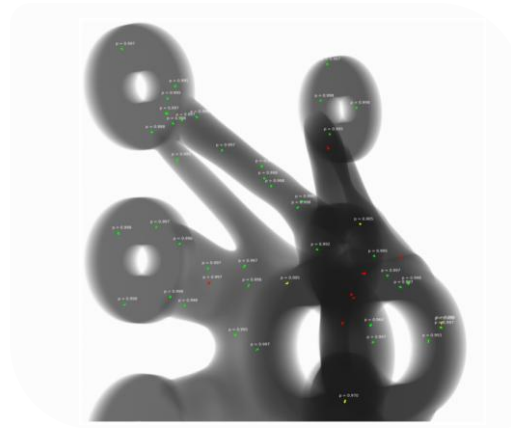
- AI & Data Literacy
- Domain-Specific Technical Expertise
- Change Management and Upskilling Plans
- AI Governance Processes



Data readiness

- High Quality and Well-Structured Data
- Secure and Compliant Data Storage
- Cross-Departmental Data Sharing Processes
- Secure Cross-Supply Chain Data Sharing Processes

HOW THE MTC CAN SUPPORT



AI SCOPING SERVICES

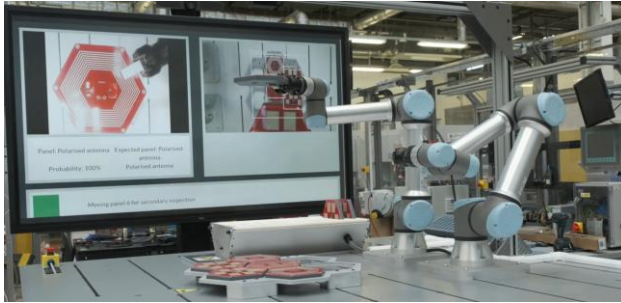


AI IMPLEMENTATION SERVICES

AI ADOPTION CASE STUDIES

Two horizontal teal lines are positioned at the bottom of the slide. The lower line is a solid straight line. The upper line follows the lower line for most of the width but features a rounded, curved segment on the right side, creating a layered effect.

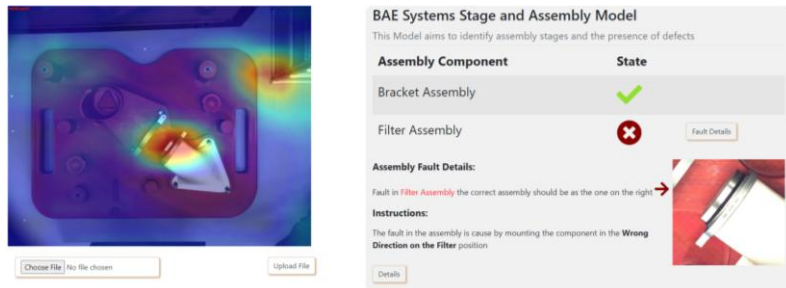
Visual Inspection



Collaborative robot automation



Localisation and tracking



Assembly verification



Defect detection



Source: <https://visionify.ai/ppe-detection-system/>

Health & safety monitoring

Description

Automation of digital perception for widescale monitoring, automation, identification and localisation.

Technology impact

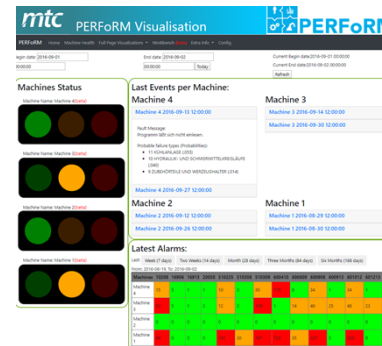
- Enhance efficiency by ensuring right-first time manufacturing and assembly.
- Reduced cost and time of verifying builds.
- Drive growth through the integration of automation technologies.
- Improve product quality and quality consistency.
- Promote a safer workplace by implementing measures to significantly decrease accidents and injuries

Optimisation & Decision Support



Source: <https://www.qualitymag.com/articles/95332-stepping-into-the-future-of-process-monitoring>

In process monitoring



Predictive maintenance



Adaptive process scheduling



Source: <https://www.kuka.com/en-us/industries/metal-industry/machine-tools>

Process parameter optimisation

Description

Data driven process and parameter optimisation driving closed loop decision support.

Technology impact

- Improve manufacturing efficiency to boost productivity and reduce operational costs.
- Extract hidden data insights to inform better decision-making.
- Cutting edge closed loop process control.
- Reduced machine down-time.
- Automated parameter optimisation to reduce time and cost.



Energy monitoring and smart data querying

Generative Ai



Private and custom LLMs (ChatGPT-like models)

The control panel is located on the right side of the factory.

Interactive vision systems

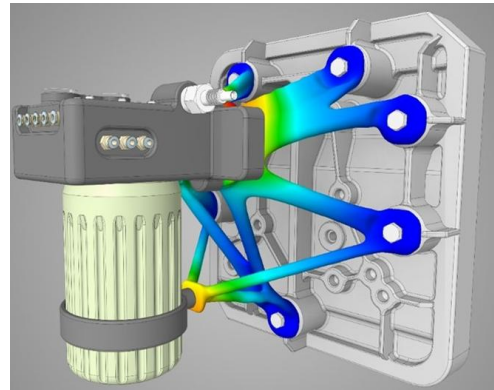
You used 1000kWh

What was my energy usage on the CNC machine last month?

How many accidents did the H&S demo help me prevent?

It helped prevent 5 accidents

Database integrated LLMs



Source: <https://edrmedeso.com/article/ansys-discovery-rapid-prototyping-and-real-time-simulations/>

AI for generative design



Source: <https://www.autodesk.com/uk/products/factory-design-utilities/overview>

Generative factory design

Description

Cutting edge technology to encourage creativity, reduce skills gap for data interaction and knowledge extraction.

Technology impact

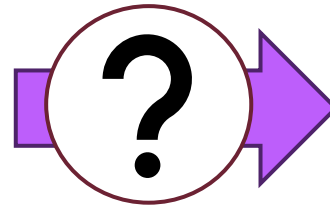
- Innovative and rapid cost-effective designs.
- Simplified interaction with complex systems to enhance operational efficiency.
- Provide improved and customized training and upskilling tools to support workforce development.
- Reduced risk of data policy non-compliance by Enhancing company and client data privacy when using AI tools.

AI & Packaging



Logistics company

We see huge potential in an AI-enabled robotics solution, but we need confidence in the maturity and scalability before investing



Unclear how robust and scalable the system is, and whether it can integrate with the logistics workflows.

Output:

- AI system performance benchmarking
- Integration readiness assessment
- Deployment architecture assessment
- Technical due diligence report



6 month

Accelerated product-market fit



£1+m

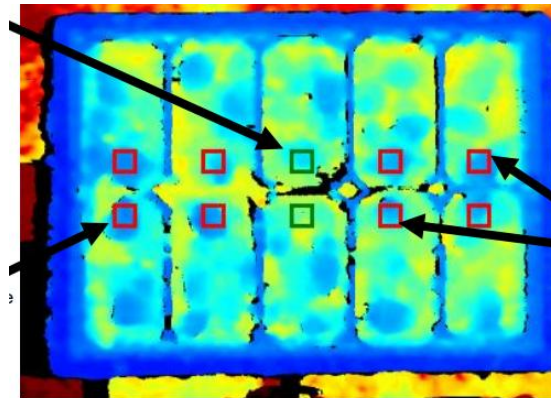
Potential costs saved for adopting an inefficient system



AI & Strawberries



Fruit ripeness



Punnet movement



Fig 38 – Sample screen grab of the results of the vision algorithm : strawberry identification

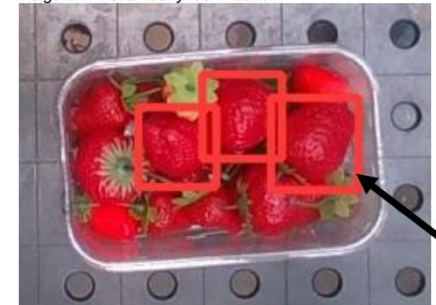
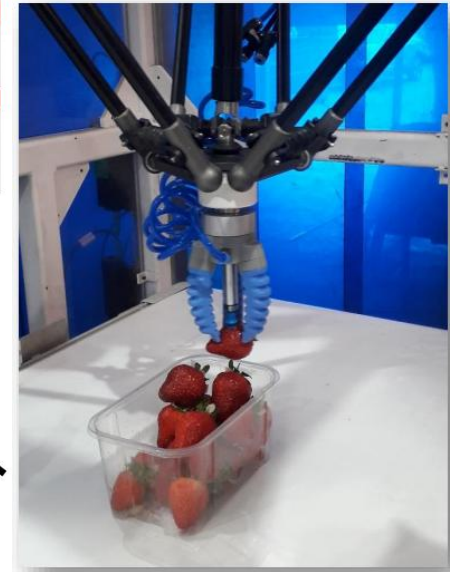
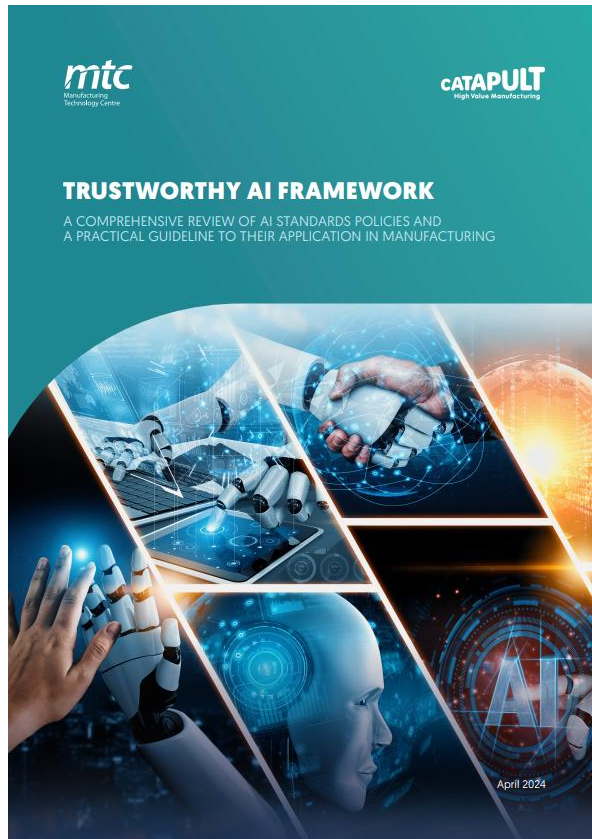


Fig 39 – Sample screen grab of the results of the vision algorithm : identification of pickable strawberry



Weight correction

Find Out More



Whitepapers – Free Access:



[MTC Whitepapers \(the-mtc.org\)](https://the-mtc.org)

Contact me:

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Thank you