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UKRI Innovate UK   BridgeAI

18 AI ideas to change the world*

* of Agriculture, Construction, Creative Industries and Transport

Innovate UK BridgeAI AI/ML Innovation Catalogue

September 2023

About Innovate UK BridgeAI

Artificial Intelligence (AI) holds enormous potential for businesses, enhancing productivity and competitiveness. However, adopting AI technology can be challenging. That's where BridgeAI comes in.

The BridgeAI programme's mission is to empower businesses in high-growth sectors within the UK, including agriculture, construction, creative, and transport industries, to harness the power of AI in a responsible and ethical manner, driving productivity and unlocking their full potential.

The programme offers funding and support to help innovators assess and implement trusted AI solutions, connect with AI experts, and elevate their AI leadership skills.

Learn more about us: https://iuk.ktn-uk.org/programme/bridgeai/

About The PSC Digital

The PSC Digital exists to make digital public services brilliant for organisations, society and individuals.

We work with our clients, using data science and user centred-design to co-create new digital services, ensuring they deliver strong financial results, are in harmony with teams and working practices, and include everyone.

Our expertise has been recognised by the Financial Times, The Economist, The Guardian, and the Health Service Journal.

Learn more about The PSC: https://thepsc.co.uk/digital

Methodology

The PSC were commissioned by Innovate UK to discover innovative use cases for AI through combining a series of innovation workshops with sector managers and further analysis and research.

1. Sector Workshops
We started by holding four intensive workshops with senior staff working in each sector. These innovation workshops explored the challenges faced 'on the ground', and developed early ideas for how AI could be used to improve productivity.
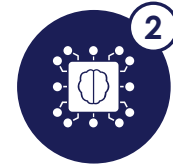
2. Testing with AI Experts
We tested with a panel of AI experts, to ensure the ideas discussed in the sector workshops were feasible to be tackled with AI, and didn't already have commercial off-the-shelf solutions available.

3. Further Analysis, Industry Survey, and Write Up
We then carried out further analysis on the shortlisted ideas, including a survey of sector decision makers to gauge interest as well as market sizing calculations. We hope that this provides confidence in the magnitude of opportunity offered by these ideas.
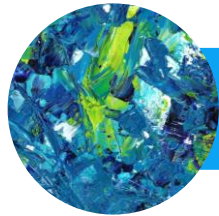
153 decision makers participated in the Industry Survey:
43 from Agriculture, 22 from Creative Industries, 54 from Construction, and 30 from Transport.

18 ideas, 4 sectors: £9.2bn of opportunity

This catalogue contains 18 ideas across 4 priority sectors where the market is ripe for AI innovation, but the market hasn't provided accessible solutions.

Agriculture*

Creative Industries

Construction

Transport

* Food Processing is also in scope for the BridgeAI programme but was not reflected in workshop attendees

Develop productivity enhancing ideas – bid for £1.2m in BridgeAI funding

Opening in September 2023, Innovate UK is **providing up to £1.2m of funding** for 12-month **Collaborative R&D** projects that develop AI and ML solutions targeting productivity in these four industries.

Awards will be granted to applications that develop AI and ML solutions addressing priority business sector challenges and opportunities.

Any project will be required to have representation from an academic partner and demonstrate research commercialisation.

Funding of **up to £100,000** is also available for 6-month **Single Entity** projects that develop AI and ML solutions to target productivity in the sectors.

Innovate UK can provide additional support with application for grants as well as providing contacts into the relevant sectors.

The competition opens in September 2023 and will provide grants of up to £1.2m for 12-month Collaborative AI projects, and up to £100,000 for 6-month Single Entity AI projects.

→ **Learn more**

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How to use this report

Each idea is laid out in the same way, giving you all the information you need in one glance:

#013 | Real Time Question Answering

What's the opportunity?
Construction projects are a complex collaboration between a variety of tradespeople, often only on site to complete specialist tasks to short timelines. However, project information is not shared effectively with tradespeople. Considerable time is wasted as they look for answers to questions, with a lack timely answers resulting in deviations from project plans. Leading to time and budget overruns. An AI solution could provide an automated, real time question answering system, giving answers based upon the latest construction plans.

Why should we tackle it?
£1.1bn
TAM (+/- £0.7bn)
Adopters can save ~32 lost labour days per employee annually, currently spent tracking down project data [36]

This would be very helpful to our business
– Construction Manager

51% of construction mangers would be likely / very likely to purchase and use this solution

What do we need to know?
- Question answering information flows tend to be ad hoc and informal, so there is limited data on the type of questions that regularly need answers
- Part of the innovation opportunity is to capture and understand current dataflows
- ...s an exciting opportunity area to improve productivity within ...onstruction sector, and research is currently in its early stages.

16

A short **explanation of the problem**, and how AI could help

A **key quote** from our survey respondents or one of our AI experts

A result from our **market research** survey on the ideas

Some background on the **state of the data** for the use case

Information on the **state of the market** for the use case

An estimate for the **total addressable market** within the UK for the solution
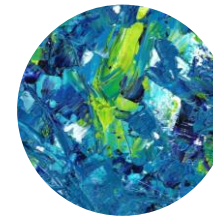
Find a use case

Browse the guide to look at every idea, or select one from the list below to jump straight to it.

Agriculture
#001 – Personalised Farm Optimiser
#002 – Precision Pest Control
#003 – Live Farm Monitoring
#004 – Automated Form Filler
#005 – Yield Predictor

Creative Industries
#006 – Content Editing and Tailoring Assistant
#007 – Natural Language Video Search
#008 – Auto Audience Analysis
#009 – IP Tracking and Auto-Litigating

Construction
#010 – Progress Monitoring and Deviation Detection
#011 – Advanced Materials Predictor
#012 – Building Plan Compliance Testing
#013 – Real Time Question Answering
#014 – 'Always On' Hazard Detection

Transport
#015 – Route Optimisation
#016 – Predictive Maintenance
#017 – Logistics Planning and Management
#018 – Data Extraction and Paperwork

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Agriculture

The British public values its farmers more than anywhere else in the world [1] but **productivity remains stubbornly low** – the median small and medium sized farm spent more on inputs than they made back in outputs [2].

There is an opportunity for AI/ML solutions to reverse this trend and help supercharge the productivity of the Agriculture sector.

£13.9bn	**34.5%**
Contribution to the UK economy in 2022 [3]	Rise in input costs over the last year [4]
54%	**0.13%**
Made a large business change in 2018 [5]	UK agriculture contribution to global sector revenue [6]

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Featured | #001 | Personalised Farm Optimiser

What's the opportunity?

In the Roman times, Pliny the Elder once said "The master's eye is the best fertilizer". Though the equipment has changed a little since, the farmer's eye controls what goes on in farm life. Data is not often used (except from weather forecast) and optimisations are made sparingly – a high risk activity with potentially low reward. AI could lead to a step change in efficient use of resources on the farm – optimising inputs, reducing waste and maximising yield.
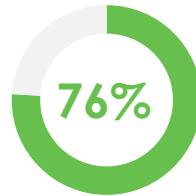
Why should we tackle it?

£1.3bn
TAM (+/- £0.9bn)

Adopters can increase agricultural productivity by ~6% by implementing precision farming [7]

The technology is there but at the moment the on-farm cost is impractically high

– AgriFood AI Expert

76% Surveyed said this was likely / very likely to benefit their industry

What do we need to know?

Data
There are no widespread big data datasets for real-time optimisation, however many of the variables which farmers use to make their decisions at current are readily available via either open APIs (weather data) or commercially available sensor technology.

Market
Research in this area is mature but there is not yet a solution available on the market. Much of the potential is around precision agriculture where inputs and feed can be optimised for individual animals.

* AI generated image

Who's the user?

John
John is a dairy farmer on an average sized dairy farm (~150 cows) in the Yorkshire countryside.

Thinks/Feels
- I love the idea of using technology to make things easier on the farm, but I need to know that products will be worth the investment

Does
- Milks the cows twice a day in the milking parlour (same time every day)
- Talks to other local dairy farmers about what's happening and what they're doing on their farms

Frustrations
- Farming is getting less profitable year on year
- There are not enough people to do the work on farms – 40% of farmers reported crop losses due to labour shortages [8]

What's the MVP?

This is quite a large opportunity so the MVP would probably focus on a single type of farming and a single process to optimise.

Some ideas include:
- Monitoring cow behaviour to optimise conditions to increase milk yield
- Optimising the choice or composition of feeds for health and yield of chickens on a poultry farm
- Working out the optimal time to harvest wheat crops, considering market prices and local farm conditions

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#002 | Precision Pest Control

What's the opportunity?

Currently, pesticide is applied in a standardised, untargeted way - in 2020 alone, UK farmers applied 17 million kg of pesticides to their crops [9]. They do this because the threat of losing their crops is huge, and the cost of spraying everything – even if unnecessary - is relatively low. However, this is bad for the environment and bad for farmers' wallets. An AI solution could help farmers to identify, detect, and precisely treat pest infestations – using less pesticide, more effectively.
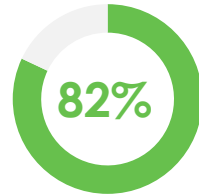
Why should we tackle it?

£90m
TAM (+/- £50m)

Adopters can reduce their spend on pesticides by ~25% [10]

[All the prerequisites] are in place for this with computer vision and sensor technology

– AgriFood AI Expert

82% Surveyed said this was likely / very likely to benefit their industry

What do we need to know?

Data
- Part of the innovation opportunity is to make best use of commercially available field-based sensors or develop a new sensor (e.g. to use smell)
- Good data is available on what compounds were used in which country and their safety. Few precision datasets exist – part of the opportunity here

Market
The research in this area is mature however nobody has yet commercialised a solution.

#003 | Live Farm Monitoring

What's the opportunity?

Farmers keep a watchful eye over their crops and livestock but can't be everywhere all at once and may miss small changes. In practice, this means that much monitoring is done on an ad hoc basis and events are only seen once it has become too late to react. An AI solution could use sensors to monitor life on the farm more precisely, detect issues earlier than farmers could and save time spent on crop walks and livestock inspections.
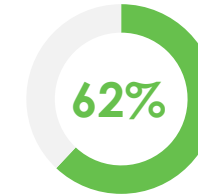
Why should we tackle it?

£240m
TAM (+/- £30m)

Globally, the live monitoring market is expected to be worth £180bn by 2030 [11]

Manual inspections on crops and livestock are time-consuming and often inaccurate

– Agriculture Manager

62% of agriculture mangers would be likely / very likely to purchase and use this solution

What do we need to know?

Data
- Various data could be used such as CO_2 levels, bacterial levels, animal weight / wearables, humidity, and crop image data
- This isn't currently consistently collected and there may be high up-front costs for sensor installation to be overcome

Market
There is a wide and deep body of research in this area ready to be exploited and some large-scale industry solutions, but none which are openly available to buy.

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#004 | Automated Form Filler

What's the opportunity?

On top of labour-intensive farming processes, agriculture requires a huge amount of data collection and reporting to fulfil the criteria for crucial agricultural subsidies. Needing to comply with ~150 pieces of legislation [12], farmers must submit a variety of different forms, across multiple websites, often in different formats (e.g. both paper and digital for movement of sheep). An AI solution could reduce duplication in data collection and ease the time burden for farmers of form submission for repetitive tasks.
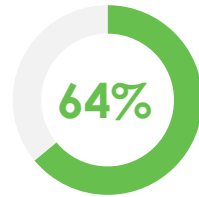
Why should we tackle it?

£210m
TAM (+/- £190m)

Adopters can save £13 for every hour of paperwork they automate [13]

One of the things that takes farmers the most time is filling in all the government forms

– Agriculture Manager

64% Surveyed said this was likely / very likely to benefit their industry

What do we need to know?

Data
- Many forms that need filling are publicly available. Government may hold datasets of submitted and scanned input forms already
- To increase dataset size, partnership working with a government department may be useful

Market
This is an important problem at an early stage of research and development. Data capture solutions which could help solve this are at a very early stage (e.g. Omnia, Green Light) but there is space to seize market share by increasing complexity through innovation.

#005 | Yield Predictor

What's the opportunity?

A farming business depends on the yield it can drive from the land with the quantity and quality of produce giving many farms most of their revenue. However, despite this, strategic decisions are often made based only on short to medium term market predictions. AI has the potential to improve the earnings of farmers by predicting long-term yield quality and quality based on soil, environmental and other farm specific factors (as well as long-term market demand and consumer trends).
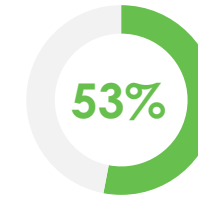
Why should we tackle it?

£490m
TAM (+/- £260m)

Adopters can increase their revenue by ~5% by deploying predictive analytics [14]

This has great potential and the toolset is there [already]

– AgriFood AI Expert

53% of agriculture mangers would be likely / very likely to purchase and use this solution

What do we need to know?

Data
- Farms will have (not necessarily digital) knowledge of the area planted (for subsidy returns) and yields obtained (from merchant invoices)
- Commercially available sensors can provide soil data quality readings and satellite data can provide farm information

Market
Research in this area is mature however has not yet been commercialised.

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Creative Industries

With a rich cultural heritage, innovative talent, and a strong digital presence, the UK's creative industries contribute significantly to the economy and play a crucial role in shaping global cultural trends. Growing at 6.9% 2021-22, compared to 1.2% for the wider economy, the creative industries are a crucial pillar of the UK's economic future [15].

AI can enhance this growth potential, streamlining processes, providing innovative insights, and freeing up resources for creativity.

£109bn
Contribution to the UK economy in 2021 [16]

32%
Of the workforce are self-employed, double the national average [17]

2.3m
Individuals employed in the creative industries [18]

5.45%
UK creative industries contribution to global sector revenue [19]

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Featured | #006 |
Content Editing and Tailoring Assistant

What's the opportunity?

The creative process, used commercially, often involves a time-consuming discussion and refinement between the creative and the client. Getting it right can take many rounds of revisions, which can reduce the time a creative could spend usefully on other projects. AI could take the burden off creatives in the early stages of projects by delivering options quickly, and ensuring investment in creative input is aligned to the clients' vision more efficiently.
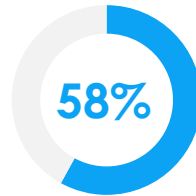
Why should we tackle it?

£160m
TAM (+/- £30m)

The innovator here has a chance to grab part of the ~£2bn sized global video editing software market [20]

[Image and video generation] is an area of significant research and getting better quickly

– Creative AI Expert

58% Surveyed said this was likely / very likely to benefit their industry

What do we need to know?

Data
Large corpuses of images exist online and many artists and creatives keep all versions of their work which could be useful for training on making adjustments specifically.

Market
Although AI image generation has become increasingly good, there is still a gap in having AI make amendments directly in editing software (i.e. integrated with industry-standard tools) and able to manipulate assets directly.

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* AI generated image

Who's the user?

Sarah
Sarah is one of over 65,000 freelance graphic designers in the UK [21], working mainly for corporate customers on packaging design work.

Thinks/Feels
- Sometimes clients are only clear on what they need once they've seen a dozen things that they definitely don't want
- I want to focus on creating new ideas, not fiddling with ones that I think are finished

Does
- Spends most of her day in graphic design software (e.g. Illustrator)
- Design workshops with clients
- Emails design proposals and near finished work for review

Frustrations
- Bigger clients are more profitable but they always ask me for more revisions than others
- Sometimes I don't get paid until the final content is done

What's the MVP?
This use case is huge and spans many of the creative industries – any innovator hoping to take it on would be wise to tackle a small, well-defined problem first.

This might look like:
- Assisting creatives to make small, menial changes to things like alignment, font sizes, and styles throughout
- Integrating with creative software to make changes to drafted text within other assets (e.g. videos, pictures, graphic assets)

#007 | Natural Language Video Search

What's the opportunity?

From creators to analysts to security personnel, many individuals invest substantial time reviewing videos for specific frames, items, and events. Without a tool for searching videos based on natural language, thousands of hours are wasted across the economy. An AI solution could empower users with the ability to employ natural language queries to efficiently locate the desired content within videos, enhancing productivity and resource allocation.
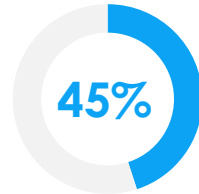
Why should we tackle it?

Cloud services can do some of this, but only via Python – natural language would be innovative
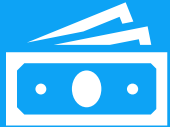
– Creative AI Expert

£150m

TAM (+/- £75m)

The UK represents 13% of the global video analytics market [22]

45% Surveyed said this was likely / very likely to benefit their industry

What do we need to know?

Data

The necessary data for video object recognition and natural language processing is readily accessible.

Market

There is a substantial body of research in natural language processing, and solutions such as Google's Cloud Video Intelligence API offer accurate object detection. There is an innovation opportunity to create a user-friendly natural language search tool, that does not require any ML or data skills to use.

#008 | Auto Audience Analysis

What's the opportunity?

Knowing what audiences think and feel about shows, films, galleries, and exhibitions has the power to transform content optimisation. Current analysis is time consuming and resource intensive, often limited to basic demographics, and challenging for smaller organisations without analytics budgets. An AI solution could analyse audience reactions, integrate advanced social listening, and generate natural language summaries of audience engagement and profiles, providing for ideas for new marketable content.

Why should we tackle it?

I love this idea – it would be great to feed into marketing tools

– Creative Manager

£140m

TAM (+/- £95m)

Performing arts contributes £11.5bn to the UK economy annually [23]

#1 Ranked idea for impact from surveyed creative managers

What do we need to know?

Data

- Commercially available camera technologies can accurately capture high resolution data necessary for audience reaction analysis
- There is abundant social media data to enable advanced social listening

Market

Research is mature in this area but there is not yet a solution available on the market.

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#009 | IP Tracking and Auto-Litigating

What's the opportunity?

In an increasingly digital age, the rapid exchange of information and ease of copying digital content presents the huge threat of digital Intellectual Property (IP) theft. Difficult to detect, and expensive to prosecute, IP theft results in financial losses for creators, diminished trust, and reduced incentives for innovation. An AI solution could track IP across the web, flagging infringements, and dispatching initial legal notifications – reducing IP theft and the reliance on legal professionals to pursue compensation.
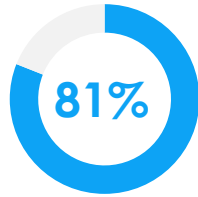
Why should we tackle it?

£130m
TAM (+/- £95m)

Digital IP theft costs the UK economy an estimated £9.2 billion per year [24]

> *Protecting intellectual property is good and useful*
>
> *– Creative Manager*

81% Surveyed said this was likely / very likely to benefit their industry

What do we need to know?

Data
Intellectual property and copyright legislation, and information on existing patents and trademarks is available within the public domain.

Market
Research in this area is mature, but there is not yet a commercially available product in the market.

Article | Ethical AI Usage

What's the problem?

The use cases in this report propose to revolutionise the way many of these sectors work – and indeed if all of them were implemented there would be a societal change in the way we all work together. Nevertheless, harnessing AI presents its own set of difficulties, and delving into the role of AI in our lives often brings up various ethical considerations.

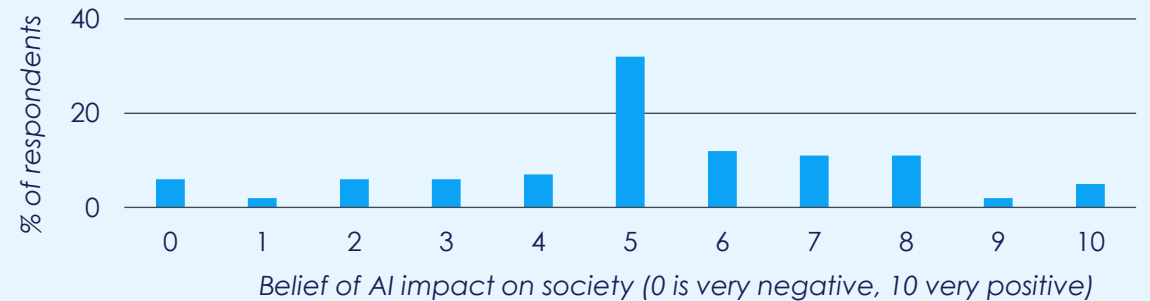These concerns tend to fall into the following categories [25]:

1. Privacy and Surveillance – how can we best safeguard individuals' work and data if it is being used to train AI models?

2. Bias and Discrimination – can we stop AI replicating and conferring additional credibility on negative human biases? (e.g. racist or sexist systems)

3. Role of Human Judgement – do some tasks need to be done by humans in order to accord legitimacy to decisions made?

   To successfully develop and bring AI solutions to the market innovators will need to engage in research and interactions with the public and potential users, to build confidence in the solutions and ensure these fears are allayed.

What do the public think?

Recent surveys have shown the public is becoming increasingly aware of AI (53% being able to give a partial explanation of AI in 2023, compared to 46% in 2022).

However, on the ethical impacts there is still room for them to be convinced with 3 in 10 UK adults having a completely neutral view on the impact AI will have on society (see below) [26].

Belief of AI impact on society (0 is very negative, 10 very positive)

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Construction

Construction is one of the largest sectors in the UK economy, but the adoption of new technologies has been more challenging to implement. With output 23% below the whole economy average, and significant labour force challenges emerging, AI has the potential to transform and invigorate the industry [27].

Leveraging the power of artificial intelligence and machine learning the construction industry can reduce waste, improve processes, and accelerate project timelines, significantly enhancing productivity across the sector.

£116bn
Contribution to the UK economy 2021 [28]

2.15m
Individuals employed in the industry [29]

61%
Of the current workforce is expected to leave in the next decade [30]

2.79%
UK construction industry contribution to global sector revenue [31]

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Featured | #010 |
Progress Monitoring and Deviation Detection

* AI generated image

Who's the user?

Sumita
Sumita is a project manager at a medium sized, regional construction firm (~70 employees), based in the Southwest of England.

What's the opportunity?

Responsible for many sub-processes, across multiple contractors, construction firms must track progress against project plans to ensure quality of delivery. Reliant on manual data collection and human observation, issues often go unnoticed, leading to costly rework after the fact. AI has the potential to transform this process, continually monitoring progress, detecting deviations from project plans, and enabling immediate corrective action to avoid future expense.
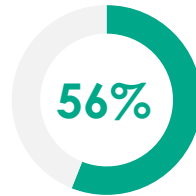
Why should we tackle it?
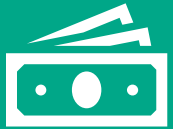
£1.4bn
TAM (+/- £0.8bn)

Adopters can reduce project costs by up to ~5% by eliminating rework [32]

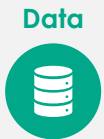*This problem doesn't need a huge dataset and the models are probably already there*

– AI Expert

56% of construction managers surveyed would be likely or very likely to purchase this if it existed

Thinks/Feels
- Technology is expensive and hard to integrate into business practices
- We are rigorous and comprehensive in our current progress tracking
- If it's not broken, don't fix it

Does
- Monitors progress across the site against plans, timelines, and budgets
- Reports to key stakeholders, including project sponsors

Frustrations
- Projects often exceed initial budgets and timelines
- Construction is a low margin industry, with disruptions having significant knock-on effects

What do we need to know?

Data
- On site: data collection for progress tracking is considerable, but manual. However, market-available sensor and camera technologies offer the potential to facilitate continuous and automated monitoring
- Cross industry: data remains siloed and there is an absence of large datasets

Market
Research in this area is mature but there is not yet a solution available in the market. Existing research fields with relevance to this use case include digital twins and computer vision detection models.

What's the MVP?
This is a significant and complex opportunity; therefore, the MVP would likely address a specific process within a larger construction project.

Some ideas include:
- Monitoring and reporting on the progress of groundworks against project plans
- Detecting and flagging errors in the erection of building frameworks

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#011 | Advanced Materials Predictor

What's the opportunity?

Forecasting and procuring materials is often inefficient, made difficult by complex supply chains, sometimes five suppliers deep, in which each individual introduces contingencies without vertical coordination. Firms purchase too much or too little, causing delays and waste, contributing to the industry's position as a leading polluter [33]. An AI solution could employ advanced analytics, considering project plans, usage data, and market conditions to recommend optimal materials and quantities. Reducing costs and helping the industry become more sustainable
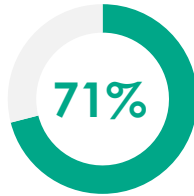
Why should we tackle it?
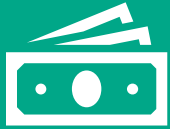
£260m
TAM (+/- £140m)

Adopters can reduce project costs by as much as 7% by eliminating the 13% of materials that are sent to landfill unused [34]

AI could be used [in this space] to analyse reasons for material waste

– Construction AI Expert

71% Surveyed said this was likely / very likely to benefit the construction industry

What do we need to know?

Data
- Relevant data is only shared between neighbours in the supply chain, leading to poor vertical information flows to inform purchasing decisions
- Regulations, company specific historical data, and market price data are readily available

Market
This is an important problem for the construction industry, and beyond, with research currently in its early stages.

#012 | Building Plan Compliance Testing

What's the opportunity?

To ensure the safety and quality of construction projects, all project plans must comply with a long list of building regulations, covering everything from materials to fire safety. Currently, responsibility for compliance lies with skilled - but expensive - experts manually checking plans against current regulations. An AI solution could automate more routine tasks, flagging any compliance issues, and recommend revisions. Speeding up processes, eliminating human error, and reducing expenditure on experts.
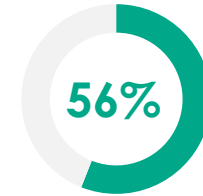
Why should we tackle it?
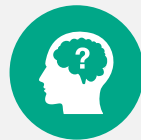
£100m
TAM (+/- £50m)

Failure to comply with building regulations can result in rework or removal of the non-compliant work [35]

Ensuring [all compliance requirements are met] can be quite tricky to do manually

–AI Expert

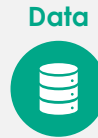**56%** of construction mangers would be likely / very likely to purchase and use this solution

What do we need to know?

Data
All requisite data is currently collected and information on the latest building regulations is available within the public domain.

Market
This is an important opportunity area, with research and development in its early stages.

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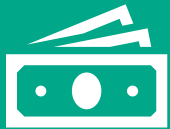
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#013 | Real Time Question Answering

What's the opportunity?

Construction projects are a complex collaboration between a variety of tradespeople, often only on site to complete specialist tasks to short timelines. However, project information is not shared effectively with tradespeople. Considerable time is wasted as they look for answers to questions, with a lack timely answers resulting in deviations from project plans. Leading to time and budget overruns. An AI solution could provide an automated, real time question answering system, giving answers based upon the latest construction plans.
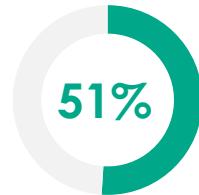
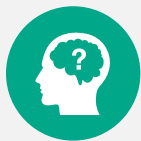**Why should we tackle it?**

£1.1bn
TAM (+/- £0.7bn)

Adopters can save ~32 lost labour days per employee annually, currently spent tracking down project data [36]

This would be very helpful to our business

– Construction Manager

51% of construction mangers would be likely / very likely to purchase and use this solution

What do we need to know?

Data
- Question answering information flows tend to be ad hoc and informal, so there is limited data on the type of questions that regularly need answers
- Part of the innovation opportunity is to capture and understand current dataflows

Market
This is an exciting opportunity area to improve productivity within the construction sector, and research is currently in its early stages.

#014 | 'Always On' Hazard Detection

What's the opportunity?

Construction is a dangerous industry, lost labour days to workplace injury and illness totalling 2.2 million [37]. With heavy machinery, multiple obstacles, and uncertain terrain, it can be difficult to identify and predict all possible hazards. An AI solution could use sensor and camera technology to continually monitor construction sites, flagging health and safety hazards before incidents materialise, and providing actionable instructions for mitigation.

Why should we tackle it?

£225m
TAM (+/- £170m)

Rates of injury in construction are almost double the all-industry average [38]

This problem is an interesting combination of computer vision and wearables

–Construction AI Expert

70% Surveyed said this was likely / very likely to benefit the construction industry

What do we need to know?

Data
- Health and safety data is already collected on construction sites, and recent developments have utilised a combination of wearables, sensors, and computer vision to detect hazards
- Industry wide datasets are not readily available

Market
There is a wide and deep body of research in this area ready to be exploited and some large-scale industry solutions, but none which are openly available to buy.

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Transport

The effective transportation of goods and people underpins UK economic activity, with 645 billion passenger kilometers travelled and 360 million tonnes of freight traded with the UK in 2021 [39]. However, output has fallen by 20% over the past five years, meaning there is substantial scope for innovation [40].

AI has the potential to transform all elements of the transport system, maximising efficiencies and boosting productivity, whilst facilitating the transition to Net Zero.

£83.5bn
Contribution to the UK economy in 2021 [41]

59,000
Shortage of HGV drivers [42]

>£5bn
Passenger journeys on public transport annually [43]

4.7%
Of global logistics industry revenues [44]

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Route Optimisation

What's the opportunity?

Accurately forecasting ever-changing demand and providing services that best meet consumer needs are vital for the effective transportation of goods and people. In logistics, the challenge of cost-intensive last-mile delivery constitutes 53% of total shipping costs [45]. Whilst inadequate route options prevent ~3.3 million North England residents from accessing opportunities and services [46]. An AI solution could predict demand and analyse requirements, suggesting routes that meet needs, whilst reducing fleet running costs. Responsible for 34% of UK carbon emissions, these solutions could enhance UK transport sustainability [47].
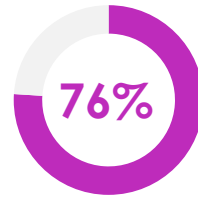
Why should we tackle it?

£1.2bn
TAM (+/- £0.8bn)

Adopters can expect to reduce fuel costs by ~15% [48]

Route planning would be most beneficial as it's currently very costly – Transport Manger

76% of transport managers said this was likely / very likely to benefit their industry

What do we need to know?

Data

Big datasets for route optimisation are readily available and the datapoints needed to forecast demand are currently measured.

Market

Research in this area is mature but there are not yet widely available solutions on the market. Current optimisation tools are focused on real time optimisation based upon traffic conditions and drop off locations, and do not factor in longer-term demand forecasting – an innovation opportunity for this use case.

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* AI generated image

Who's the user?

Daniel
Daniel is the director of a small logistics firm (8 vehicles) moving goods throughout the UK.

Thinks/Feels
- We must keep reducing our delivery times to remain competitive within the market
- Technology is helpful but we don't know where to start
- We will invest if there is a significant return on investment

Does
- Plan routes and schedules geographically dispersed workforce
- Tries to anticipate disruptions and bottlenecks in the delivery process

Frustrations
- Deliveries are inefficient and our routes are subject to constant change and disruption
- High fuel costs and increasing emissions targets are eating into our margins

What's the MVP?
This is quite a large opportunity with varied applications, so the MVP would likely focus on a specific area.

Some ideas include:
- Route optimisation for local bus services to better meet public demand
- Route optimisation for road freight companies to improve last mile delivery

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#016 | Predictive Maintenance

What's the opportunity?

Maintenance is an unavoidable and expensive reality of fleet management, costing approximately 8p per mile [49]. Without accurate prediction, firms either conduct maintenance very often and above what is required; or hold out until expensive problems occur, resulting in significant unplanned downtime. An AI solution could use sensor data, component data, and usage rates to accurately predict when maintenance is required, allowing operators to act ahead of time and avoid unexpected disruptions.

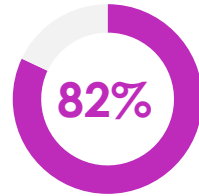## Why should we tackle it?

£1.2bn
TAM (+/- £0.7bn)

Adopters can reduce maintenance costs by ~20% and increase vehicle uptime by ~8% [50][51]

This idea would ensure regular availability [of my assets] so shouldn't be looked down upon

— Transport Manager

82% of transport managers would be likely / very likely to purchase and use this solution

What do we need to know?

Data
- Sensors to capture predictive maintenance datapoints are readily available on the market, and large datasets are also available
- Predictive maintenance models have been developed and successfully deployed within manufacturing, with cross-over potential

Market
There is a wide and deep body of research in this area, and large organisations have developed their own solutions. This innovation opportunity involves scalability and commercialisation to all market participants.

#017 | Logistics Planning and Management

What's the opportunity?

Logistics companies continually grapple with the task of forecasting transport and attribute needs (e.g., dimensions or refrigeration), faced with complex supply chains, unpredictable external factors, and continually evolving requirements. An AI solution could enhance logistics forecasting and planning, analysing data patterns and demand fluctuations to optimise resource allocation, providing recommendations for capital investment to better align to market conditions.

Why should we tackle it?

£420m
TAM (+/- £280m)

Approximately 30% of HGV kilometres are driven unloaded [52]

It's [currently] really difficult to know everything that affects us

— Transport Manager

#1 Ranked idea for impact from surveyed transport managers

What do we need to know?

Data
Logistics firms generate and capture all necessary data for advanced predictive optimisation, with further information available from a range of public sources.

Market
There is a wide and deep body of research in this area, however solutions are only available for very large organisations with many assets. Providing solutions for all logistics operators is an area ripe for innovation.

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#018 | Data Extraction and Paperwork

What's the opportunity?

Paperwork and accurate data underpin global supply chains and as a result, logistics operators face substantial administrative requirements. Extracting appropriate asset data, and completing necessary paperwork is a time intensive process, with each document processed estimated to have a labour cost of £2.60 [53]. With around 12 billion documents exchanged in ocean freight forwarding alone each year, costs quickly accumulate [54]. An AI solution could extract, store, and autofill paperwork, eliminating human error and generating significant time-cost savings.
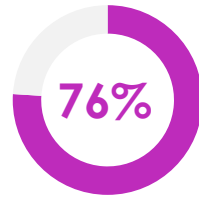
Why should we tackle it?

£310m
TAM (+/- £180m)

Adopters can reduce the labour cost of administrative tasks, which account for 8% of total costs [55]

Customs documents are the bane of my life

– Transport Manager

76% of transport managers rated this as likely / very likely to benefit their industry

What do we need to know?

Data
All documents required for freight transport are accessible and most companies have comprehensive records of existing paperwork.

Market
Research is mature in this area, and organisations are currently working on commercialising solutions for market.

Article | Barriers to AI Adoption

What's the problem?

Though part of the issue in these industries has been the lack of commercially available solutions, there remain a few more general barriers which any innovator will need to keep in mind when commercialising any of these ideas to ensure people want to – and can – adopt the proposed solutions.

These fall into the following categories [56]:

1. Desire and strategy to use AI
2. Data quality and quantity
3. Skills to implement AI

How can we encourage more people to make the most of AI?

The best way to generate desire is to solve a real problem for end users – hiding the complexity of the AI behind solving a real problem. Another way to breed this desire is to ensure senior leaders within a company are bought into using it throughout the organisation and have incorporated it into their strategy.

What can we do to make data more available?

The best way to make data more available is to maximise the utility of data that is already being created/collected for other purposes. In many use cases presented, there is also the ability to repurpose generic hardware for specialist purposes to collect a huge amount of data quickly (e.g. wearable cameras, soil sensors and phones/wearables)

How can we surmount the skills shortage?

Part of the problem which is leading to the skills shortage is that much of the AI technology that can be deployed today requires specialised data analysis or programming skills. The most successful commercial solutions will be user friendly to the extent that the need for specialist skills is minimal.

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References

1. Department for Environment, Food & Rural Affairs, "Farm performance and productivity," Feb. 02, 2021. Available: https://www.gov.uk/government/publications/farming-and-environment-evidence-packs-latest-editions [Accessed Aug. 11, 2023]
2. Department for Environment, Food & Rural Affairs, "Farm performance and productivity," Feb. 02, 2021. Available: https://www.gov.uk/government/publications/farming-and-environment-evidence-packs-latest-editions [Accessed Aug. 11, 2023]
3. Department for Environment, Food & Rural Affairs, "Agriculture in the United Kingdom 2022," Jul. 13, 2023. Available: https://www.gov.uk/government/statistics/agriculture-in-the-united-kingdom-2022 [Accessed Aug. 11, 2023]
4. Farmers Weekly, "How ag Inflation is affecting farm inputs," Oct. 25, 2022. Available: https://www.fwi.co.uk/business/business-management/agricultural-transition/how-ag-inflation-is-affecting-farm-inputs [Accessed Aug. 11, 2023]
5. Department for Environment, Food & Rural Affairs, "Farm performance and productivity," Feb. 02, 2021. Available: https://www.gov.uk/government/publications/farming-and-environment-evidence-packs-latest-editions [Accessed Aug. 11, 2023]
6. The PSC Analysis
7. Association of Equipment Manufacturers, "The Environmental Benefits of Precision Agriculture Quantified", Jul. 05, 2023. Available: https://www.aem.org/news/the-environmental-benefits-of-precision-agriculture-quantified [Accessed Aug. 19, 2023]
8. National Farmers Union, "Labour Shortages Cost Millions in Fruit and Veg Waste", Aug. 12, 2022. Available: https://www.nfuonline.com/updates-and-information/nfu-horticulture-mid-season-labour-survey-results/ [Accessed Aug. 21, 2023]
9. Department for Environment, Food & Rural Affairs, "Agriculture in the United Kingdom 2022," Jul. 13, 2023. Available: https://www.gov.uk/government/statistics/agriculture-in-the-united-kingdom-2022 [Accessed Aug. 11, 2023]
10. CropLife Europe, "Digital and precision agriculture," 2023. Available: https://croplifeeurope.eu/our-priorities/precision-digital-agriculture/ [Accessed Aug. 10, 2023]
11. McKinsey & Company, "Agriculture's connected future: How technology can yield new growth," Oct. 09, 2020. Available: https://www.mckinsey.com/industries/agriculture/our-insights/agricultures-connected-future-how-technology-can-yield-new-growth [Accessed Aug. 10, 2023]
12. Department for Environment, Food and Rural Affairs, "Understanding and Improving Farming Regulation", Mar. 2, 2022. Available: https://defrafarming.blog.gov.uk/2022/03/02/understanding-and-improving-farming-regulation/ [Accessed Aug. 21, 2023]
13. Agriculture and Horticulture Development Board, "Agriculture labour costs grew through 2022," Jul. 19, 2023. Available: https://ahdb.org.uk/news/agriculture-labour-costs-grew-through-2022 [Accessed Aug. 10, 2023]
14. Graphite, "What is Predictive Analytics, and How Can it Benefit Your Business in 2023?," Jan. 01, 2023. Available: https://graphite-note.com/what-is-predictive-analytics-benefit-business [Accessed Aug. 10, 2023]
15. House of Lords Library, "Arts and Creative Industries: The Case For a Strategy", Dec. 01, 2022. Available: https://lordslibrary.parliament.uk/arts-and-creative-industries-the-case-for-a-strategy/ [Accessed Aug. 17, 2023]
16. House of Lords Library, "Arts and Creative Industries: The Case For a Strategy", Dec. 01, 2022. Available: https://lordslibrary.parliament.uk/arts-and-creative-industries-the-case-for-a-strategy/ [Accessed Aug. 17, 2023]
17. Creative Industries Policy and Evidence Centre, "National Statistics on the Creative Industries", Jun. 28, 2022. Available: https://pec.ac.uk/news/national-statistics-on-the-creative-industries [Accessed Aug. 16, 2023]
18. Creative Industries Policy and Evidence Centre, "National Statistics on the Creative Industries", Jun. 28, 2022. Available: https://pec.ac.uk/news/national-statistics-on-the-creative-industries [Accessed Aug. 16, 2023]
19. The PSC Analysis
20. The PSC Analysis
21. Design Council, "Design Industry Research 2010", Jan. 15, 2010. Available: https://www.designcouncil.org.uk/our-resources/archive/reports-resources/design-industry-research-2010/ [Accessed Aug. 19, 2023]
22. The PSC Analysis
23. House of Lords Library, "Supporting the Performing Arts", Mar. 27, 2023. Available: https://lordslibrary.parliament.uk/supporting-the-performing-arts/# [Accessed Aug. 15, 2023]
24. Cabinet Office, "The Cost of Cyber Crime", Feb. 17, 2011. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/60942/THE-COST-OF-CYBER-CRIME-SUMMARY-FINAL.pdf [Accessed Aug. 15, 2023]
25. Pazzanese, C., "Great promise but potential for peril," Oct. 26, 2020. The Harvard Gazette. Available: https://news.harvard.edu/gazette/story/2020/10/ethical-concerns-mount-as-ai-takes-bigger-decision-making-role/ [Accessed Aug. 17, 2023]
26. Office for National Statistics, "Understanding AI uptake and sentiment among people and business in the UK: June 2023," Jun. 16, 2023. Available: https://www.ons.gov.uk/businessindustryandtrade/itandinternetindustry/articles/understandingaiuptakeandsentimentamongpeopleandbusinessesintheuk/june2023 [Accessed Aug. 17, 2023]
27. ONS, "Productivity in the Construction Industry, UK: 2021", Oct. 19, 2021. Available: https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/articles/productivityintheconstructionindustryuk2021/2021-10-19 [Accessed Aug. 14, 2023]
28. ONS, "Construction Statistic, Great Britain: 2021", Nov. 18, 2022. Available: https://www.ons.gov.uk/businessindustryandtrade/constructionindustry/articles/constructionstatistics/2021. [Accessed Aug. 12, 2023]
29. ONS, "Construction Statistic, Great Britain: 2021", Nov. 18, 2022. Available: https://www.ons.gov.uk/businessindustryandtrade/constructionindustry/articles/constructionstatistics/2021 [Accessed Aug. 12, 2023]
30. PBCToday, "5 Major Challenges in Construction", Oct, 3, 2022. Available: https://www.pbctoday.co.uk/news/digital-construction-news/bim-news/5-major-challenges-in-construction/114387/ [Accessed Aug. 15, 2023]
31. The PSC Analysis
32. AXA, "Critical Construction Risk Topics: Rework Costs Time and Money", May 16, 2022. Available: https://axaxl.com/fast-fast-forward/articles/critical-construction-risk-topics_rework-costs-time-and-money [Accessed Aug. 15, 2023]
33. Chartered Institute of Environmental Health, "Construction Industry Responsible for 18% of UK's Large Particle Pollution", Nov. 03, 2022. Available: https://www.cieh.org/ehn/environmental-protection/2022/november/construction-industry-responsible-for-18-of-uk-s-large-particle-pollution/ [Accessed Aug. 19, 2023]
34. Designing Buildings, "Construction Waste", Mar. 16, 2023. Available: https://www.designingbuildings.co.uk/wiki/Construction_waste [Accessed Aug. 17, 2023]
35. Local Authority Board Control, "Are There Any Penalties For Not Complying With The Building Regulations?", Undisclosed Publishing Date. Available: https://www.labc.co.uk/homeowners/homeowners-faqs/are-there-any-penalties-not-complying-building-regulations [Accessed Aug. 17, 2023]
36. LetsBuild, "Major Construction Time Wasters Cost $177 billion Per Year", Sept. 20, 2018. Available: https://www.countfire.com/blog/construction-industry-sustainability [Accessed Aug. 15, 2023]
37. Health and Safety Executive, "Construction Statistics in Great Britain, 2022", November 23 2022. Available: https://www.hse.gov.uk/statistics/industry/index.htm [Accessed Aug. 16, 2023]
38. Health and Safety Executive, "Construction Statistics in Great Britain, 2022", November 23 2022. Available: https://www.hse.gov.uk/statistics/industry/index.htm [Accessed Aug. 16, 2023]
39. Department for Transport, "Transport Statistics Great Britain", Dec 15, 2022. Available: https://www.gov.uk/government/collections/transport-statistics-great-britain#transport-statistics-great-britain- [Accessed Aug 16. 2023]
40. Department for Transport, "Transport Statistics Great Britain", Dec 15, 2022. Available: https://www.gov.uk/government/collections/transport-statistics-great-britain#transport-statistics-great-britain- [Accessed Aug 16. 2023]
41. Department for Transport. Twitter, Jun. 28, 2023. Available: https://twitter.com/transportgovuk/status/1673948435823706113 [Accessed Aug. 17, 2023]
42. Logistcs UK, "HG Driver Shortage Climbs to 59,000", Oct. 14, 2019. Available: https://logistics.org.uk/media/press-releases/2019/october-2019/hgv-driver-shortage-climbs-to-59-000 [Accessed Aug. 12, 2023]
43. Department for Transport, "Modal Comparisons (TSGB01)", Feb. 21, 2023. Available: https://www.gov.uk/government/statistical-data-sets/tsgb01-modal-comparisons#passenger-transport [Accessed Aug. 15, 2023]
44. The PSC Analysis
45. Insider Intelligence, "The Challenges of Last Mile Delivery Logistics", Jan. 09, 2023. Available: https://www.insiderintelligence.com/insights/last-mile-delivery-shipping-explained/ [Accessed Aug. 15, 2023]
46. Transport For The North, "The causes, consequences, and extent of transport-related social exclusion in the North", Sept. 23 2022. Available: https://transportforthenorth.com/blogs/the-causes-consequences-and-extent-of-transport-related-social-exclusion-in-the-north/ [Accessed Aug. 16, 2023]
47. Department for Energy, Security & Net Zero, "2022 UK Greenhouse Gas Emissions, Provisional Statistics", Mar. 30, 2023. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147372/2022_Provisional_emissions_statistics_report.pdf [Accessed Aug. 20, 2023]
48. OptimoRoute, "The Ultimate Guide to Route Optimisation in 2022", Jan. 01, 2022. Available: https://optimoroute.com/what-is-route-optimization/#:~:text=The%20use%20of%20route%20optimization,fuel%20costs%20and%20driver%20wages. [Accessed Aug. 15, 2023]
49. Freightwaves Sonar, "Operating a Truck", Undisclosed Publishing Date. Available: https://sonar.freightwaves.com/freight-market-blog/operating-a-truck-infographic [Accessed Aug. 15, 2023]
50. McKinsey, "Digitally Enabled Reliability: Beyond Predicative Maintenance", Oct. 4, 2018. Available: https://www.mckinsey.com/capabilities/operations/our-insights/digitally-enabled-reliability-beyond-predictive-maintenance. [Accessed Aug. 15, 2023]
51. Fleet Maintenance, "How Predictive Maintenance Can Save Fleets a Fortune", Feb. 15, 2023. Available: https://www.fleetmaintenance.com/shop-operations/data-and-telematics/article/21293161/saving-a-fortune-with-predictive-maintenance. [Accessed Aug. 17, 2023]
52. Department for Transport, "Domestic Road Freight Activity", Jun. 22, 2023. Available: https://www.gov.uk/government/statistical-data-sets/rfs01-goods-lifted-and-distance-hauled#overall-trends-in-domestic-road-freight. [Accessed Aug. 13. 2023]
53. Shipamax, "The Real Costs of Manual Data Entry for Logistics Organisations", Aug. 01, 2023. Available: https://www.shipamax.com/blog/costs-of-manual-data-entry-in-logistics [Accessed Aug. 17, 2023]
54. Radium Warehouse and Logistics, "Automated Document Processing", Unknown Date. Available: https://radiuslogistics.co.uk/guide/automated-document-processing-how-can-it-benefit-your-business/. [Accessed Aug. 11, 2023]
55. Jean-Paul Rodrigue, "The Geography of Transport Systems", 2020. Available: https://transportgeography.org/contents/chapter7/logistics-freight-distribution/global-logistics-costs-function/ [Accessed Aug. 15, 2023]
56. McKinsey, "Notes From The AI Frontier: AI adoption advances, but foundational barriers remain", Nov. 12, 2018. Available: https://www.mckinsey.com/featured-insights/artificial-intelligence/ai-adoption-advances-but-foundational-barriers-remain [Accessed Aug

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