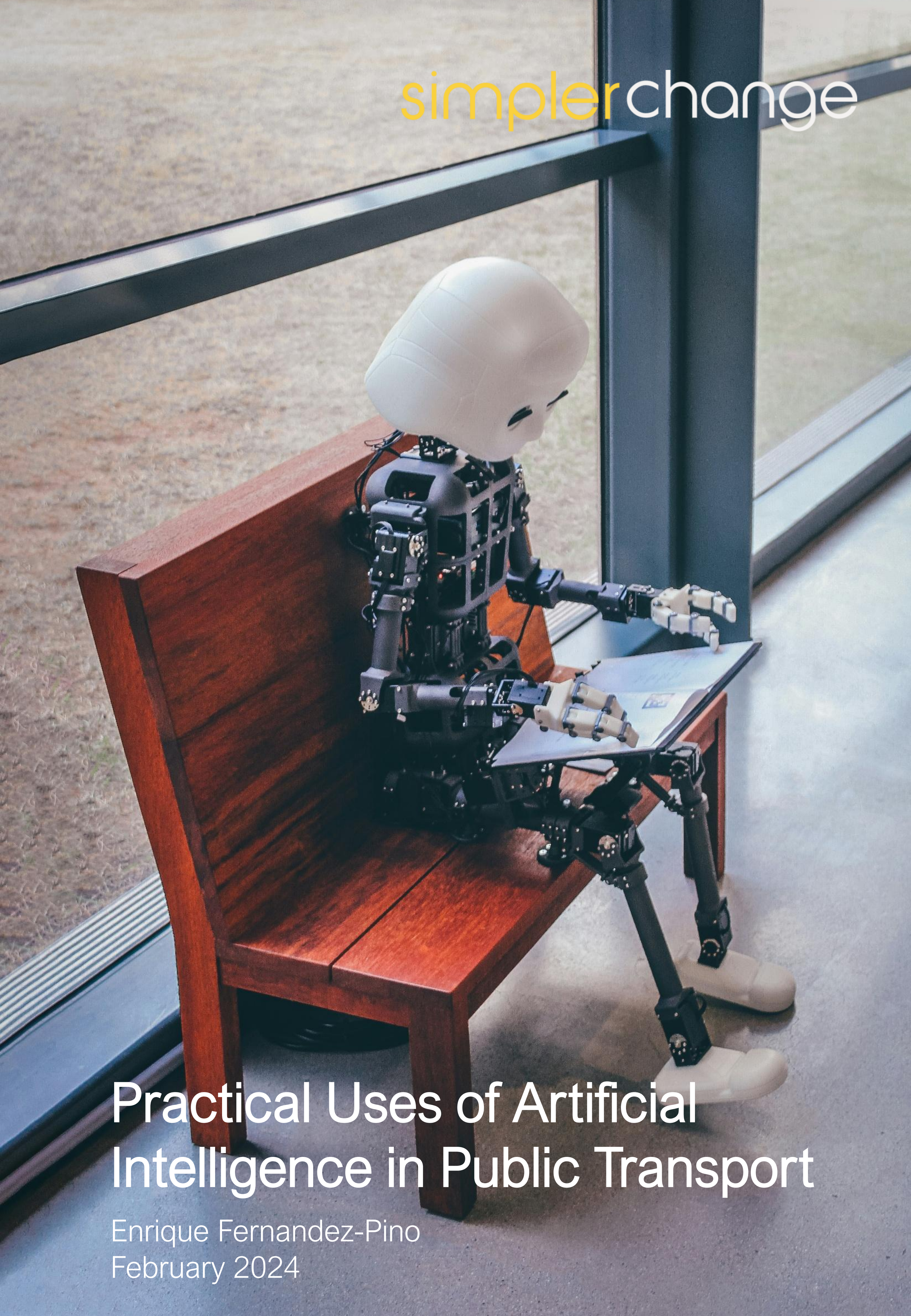

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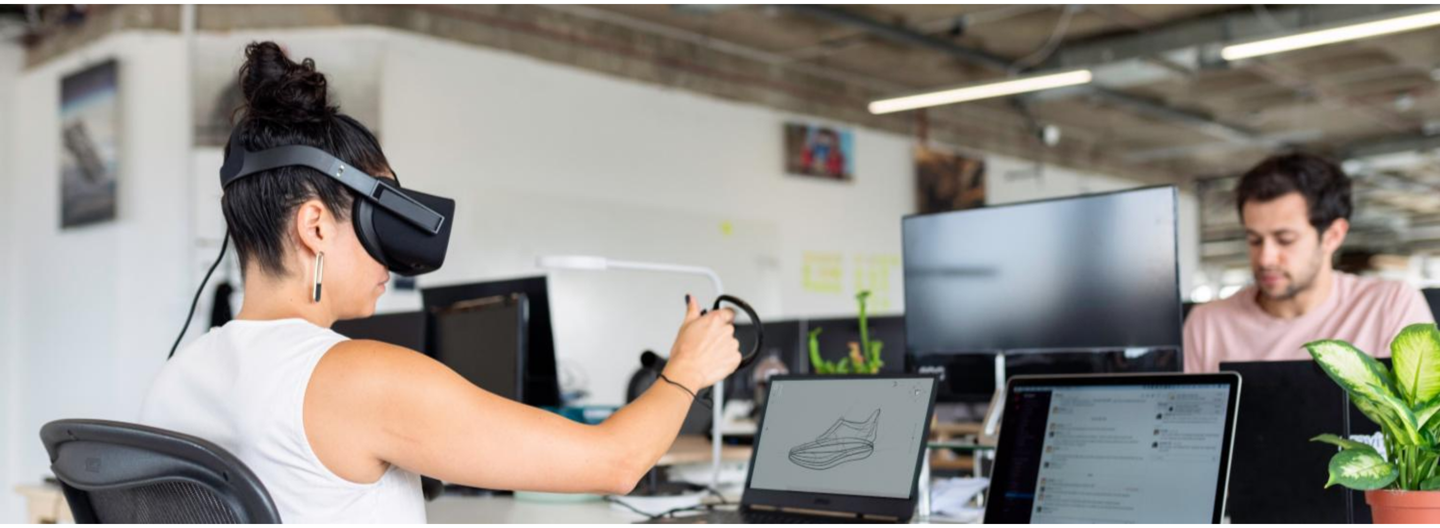
Practical Uses of Artificial Intelligence in Public Transport

Enrique Fernandez-Pino

February 2024



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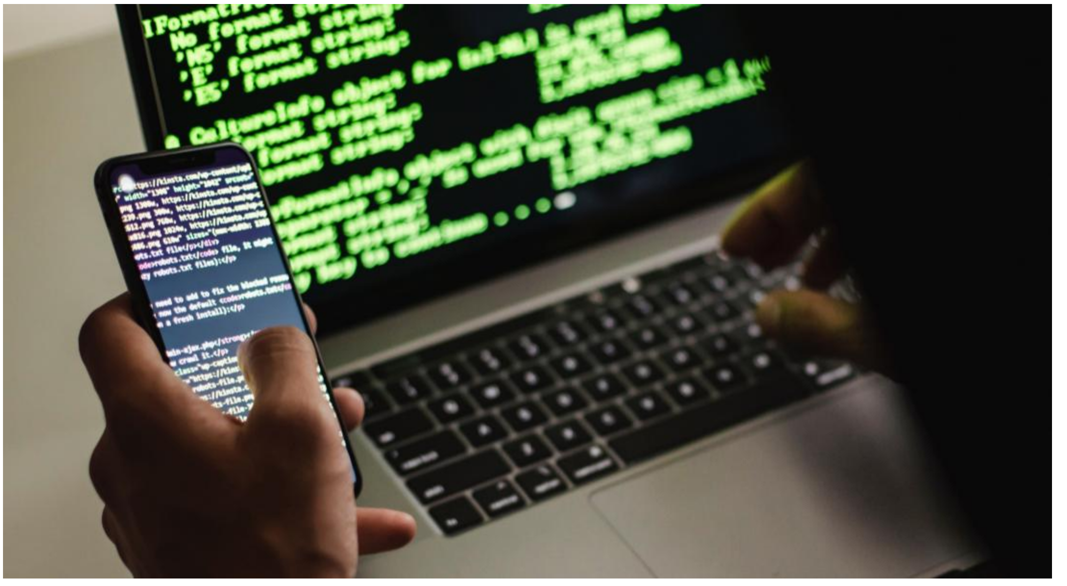
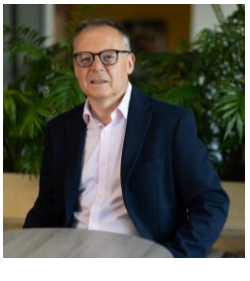


It' not too long since I wrote my *Impact of Digitalisation on the Public Transport Industry* paper, but boy oh boy, have things changed since 2020. It feels like Artificial Intelligence (AI for friends) has sneaked into our lives in the last couple of years like a tidal wave. However, those of you that have been working with technology and innovation for a while know that AI is not new. The simple computers that landed the man on the moon in 1969 were already using an element of artificial intelligence.

What has changed in the last few months is the accessibility to the technology, as well as the intensity of its use. I am sure that history will treat Chat GPT as it treats James Watt and the invention of the steam engine: this was not just an invention that automated some of the more mechanical tasks done by humans in small ateliers, but the start of a completely new way of looking at the production of goods and services for humanity. Perhaps Mr Watt was conscious that he was bringing a new way of living for humans. Perhaps he was not. But AI will, not only digitalise the work we do, but fundamentally change the way humans interact with their world. A kind of Kubrick's 2001: A Space Odyssey dawn of a new era. Nobody knows what changes AI will bring. But we can be certain that they will be big. And that they will be impactful. And, albeit in small scale today, these changes have started to be evident in our sector and they cannot be ignored.

Climate change makes it imperative to move travellers from the comfort of their vehicles to the potentially less comfortable, but hugely more environmental public transport. And we believe that clever and ethical use of AI can help transport authorities and operators move people in the right direction.

In this white paper we analyse the different areas where AI can help public transport, making it more enticing, simpler and cheaper for operators and passengers.



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Artificial Intelligence (AI) is not new

Artificial Intelligence (AI) has come a long way from its roots as a conceptual idea to its modern-day status. While the technical details can be complex, the journey of AI is one of human ingenuity, ambition, and the pursuit of emulating intelligence.

The idea of creating intelligent machines predates the modern era. Ancient myths and stories often featured automations and mechanical beings. Greek myths, tell us of Talos, a giant bronze automaton created by Hephaestus. During the Renaissance, inventors like Leonardo da Vinci sketched designs for mechanical creations resembling robots. In the 17th Century René Descartes proposed that human thought could be explained in mechanistic terms.

But the true concept of AI Started in mid-20th century with Alan Turing’s 1950 paper, "Computing Machinery and Intelligence".

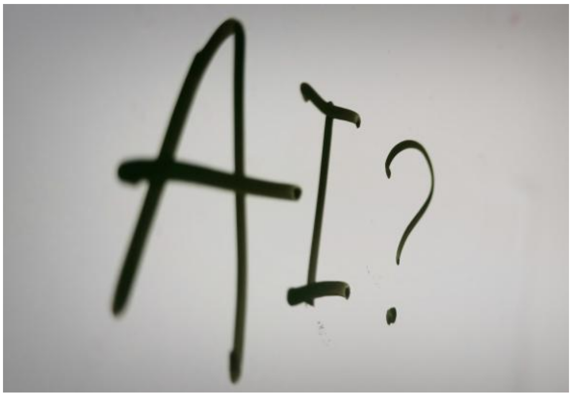
The actual term "artificial intelligence" was coined in 1956, when researchers began developing early programs capable of solving mathematical problems and playing games like chess. During the 70s and 80s progress was slow, with a resurgence in the 1990s, fuelled by advances in computational power and algorithmic innovation.

A landmark achievement saw IBM’s Deep Blue defeating chess grandmaster Garry Kasparov in 1997.

The 2010s marked a turning point for AI: deep learning, a subset of machine learning, leveraged neural networks to achieve breakthroughs in image recognition, natural language processing, and more.

Other innovations like virtual assistants, recommendation systems, and autonomous vehicles became mainstream.

In 2016, AlphaGo, developed by DeepMind, defeated a world champion Go player, showcasing AI’s capacity for complex strategic thinking. More recently, AI models like Chat GPT, capable of generating human-like text, images, and even music have demonstrated its creative potential.



… and it is not magical.

If you have used Chat GPT recently, you could not help but think that AI is at Harry Potter level of magic.

However, AI is not magic. It is the result of carefully designed algorithms and extensive data analysis that allow machines to replicate certain aspects of human thinking.

At its core, AI operates by processing large amounts of data, identifying patterns, and applying statistical models to make predictions or decisions. For example, when an AI system recommends a movie or recognises a face, it’s not guessing, it is using mathematical techniques and programmed logic to analyse information and draw conclusions.

AI is built on scientific principles, such as mathematics, computer programming, and data analysis, combined with advances in hardware and software. These technologies enable machines to perform complex computations at incredible speeds, making AI an innovative tool to solve problems and enhance decision-making.

The Ingredients of AI (the senses)

Ultimately, AI is about replicating human behaviour, although enhanced through technology. Just like humans, to be able to create outputs, AI needs inputs (senses) and a process (body awareness and intelligence). Let's have a quick look at the ingredients of AI…

Computer Vision

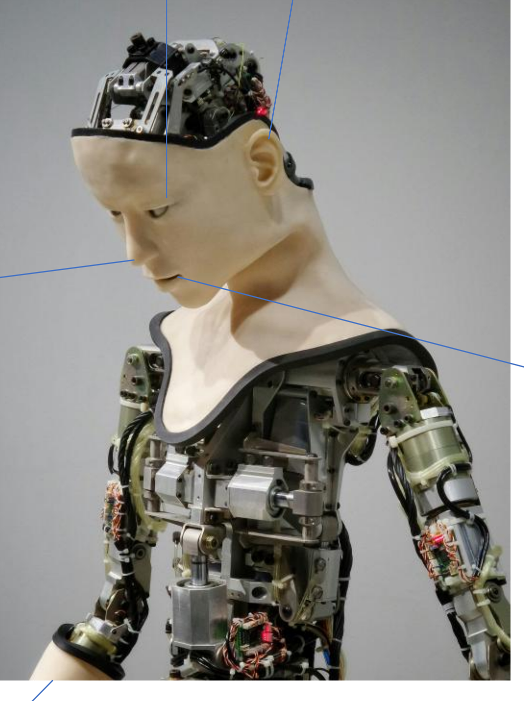
Camera or LIDAR, coupled with software can now detect and recognise objects and faces, even analyse video, or looking for specific features in the video.

Computer vision is starting to be actively applied in areas like autonomous vehicles, surveillance, medical imaging, and augmented reality.

Computer Audio

Microphones, coupled with software can now recognise speech and process audio.

For this we use techniques like sound classification, or natural language understanding from audio. Computer audio is starting to be actively applied in virtual assistants (e.g., (Siri, Alexa), transcription services, or music analysis (e.g., Shazam).



Electronic Nose (E-nose)

Sensors are now capable of odour detection and chemical analysis.

Once processed through sensor arrays and machine learning, it is starting to be used in areas such as food quality control, environmental monitoring, or medical diagnostics.

Electronic Taste (E-tongue)

Sensors are now capable of analysing chemical compositions for flavours or toxins.

Like e-nose, sensor arrays can detect PH, or ion, run the data through machine learning models and provide tools in areas such as food and beverage testing, or water quality analysis.

Tactile Sensors

Sensor arrays for pressure sensing, texture identification, or force feedback, provide the mechanisms for haptic feedback, or reinforcement learning for robotics.

We find these in mobile devices and places like robotics, prosthetics, or virtual reality.

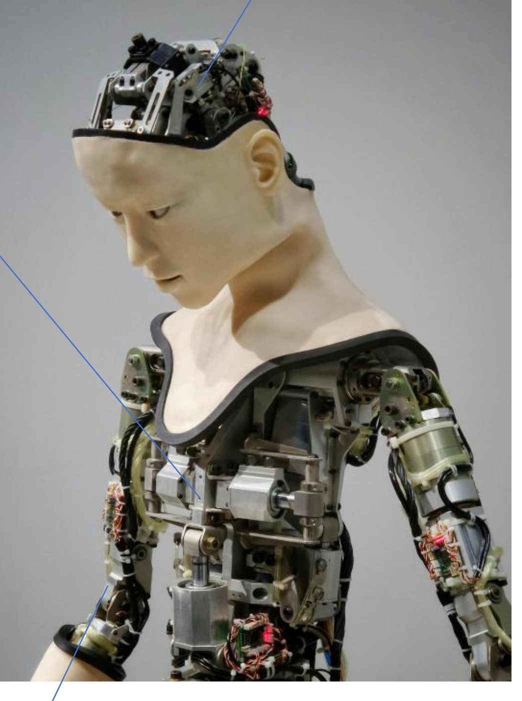
The Ingredients of AI (the brain)

Cognitive Intelligence (Higher Processing) → AI Models

For all this to work, and just like a human, AI needs a 'brain' capable of reasoning, problem-solving, memory recall, and decision-making.

We are starting to use techniques such as Large Language Models (LLMs), reinforcement learning, or neural networks.

Ultimately, this 'brain' is what drives the use of AI in chatbots, recommendation systems, generative AI (e.g., ChatGPT), game AI, or strategic planning.



Body Awareness

Detecting body movement, and spatial orientation are critical for Robotics, AR/VR systems, or wearable fitness devices.

For this we use tools like gyroscopes, or accelerometers combined with AI models.

Motor Control (Action) → Robotics

Robotics is about replicating the way human bones, muscles and tendons integrate with the brain and the sensors, to produce movement, object manipulation, and interaction with the physical environment.

Robotics are now being successfully used in industrial automation (assembly lines, welding, sorting), healthcare (surgical robots, rehabilitation aids), service robots (delivery, cleaning, personal assistance), or exploration (space rovers, underwater robots).

Instead of Artificial Intelligence, we could talk about an **Artificial Human**, with enhanced capabilities, or even of a Super-Human.

The AI Recipe

Just like any good restaurant, a good recipe does not start from the ingredients, but from what the customer wants to eat. With technology in general, and AI in particular, there is always a risk of starting from the tech, instead of from a customer's need.

But just like with any good recipe, we also need great ingredients, and a great cook.

1 Great or Curious Hunger (The Need).

Often, AI problems start from the tech, developing a solution that then must look for problems to fix. This often translates into a significant waste of money and resources, and frustration on the outcome from senior management.

Unfortunately, this happens just too often. Best AI projects are those that start from a need: a business problem (or opportunity) looking for a solution. "I wish I had", or "I wish I could (verb)" are often great starter sentences for AI solutions.

Always start from the need, not from the tech.

2 Great Ingredients (The Data).

Data is the foundations upon which AI models are built, trained, and refined. Without sufficient and relevant data, AI models are essentially blind, unable to make informed decisions or deliver meaningful insights. Even worse, bad data may mislead AI which in return will produce dangerous misleading conclusions and recommendations.

AI needs great data. If your data is not robust and clean enough, do not attempt to run AI projects. Building AI solutions on bad or flawed data can be incredibly dangerous.

Incomplete, or confused data used to train an AI system, will result in incomplete, confused, or misleading outcomes. Biased data could perpetuate or even amplify those biases. The risks are not only technical, but also operational and reputational, as flawed AI systems can erode trust and lead to legal or societal backlash.

Rubbish in always equals Rubbish out.

3 A Great Cook.

A hungry customer and the best produce does not necessarily lead to great results. For this, there is a need for a great cook. And as AI is now at the peak of the hype, many people will present themselves as 'AI specialists'. When recruiting a leader to help you drive AI initiatives, it helps looking for technical expertise, but also for evidence of pragmatic solution development. Often, a good understanding of other industries helps.

For public transport, and public sector in general, it is also important to look for evidence of ethical and responsible behaviour.

A great solution could be based on developing your internal team, complemented by an experienced fractional leader, to support and mentor the team on a part time basis, bringing the knowledge, the experience, and, more importantly, the 'scars'.

Practical Uses of AI

Now that we understand the ingredients used for AI, as well as the recipe for success, we can start looking at several practical uses of AI in public transport.

1 Computer Vision

We have seen how AI uses cameras or LIDAR (remote detection of shapes through laser) to recognise objects and analyse video. Just like human's eyes do. When designing AI for public transport, we must consider those areas where we wish we could see more, see better, or see more detail. We could also consider those cases when we wish our vision were detailed enough and patient enough to spot patterns, like counting the number of people with red coats on a crowded station at mid-day.

Passenger Counting and Monitoring

Passenger Counting and Monitoring starts from a wish: "I wish I could count the number of passengers boarding and alighting in real-time, as I could improve my service design, leading to service efficiency, money savings and increase customer satisfaction through more adequate frequency of service".

Cameras installed in buses and trains can track passenger flow, helping optimise routes and schedules. But of course, this could give you a GDPR headache, and a significant penalty on a data leak. So, how about using cameras placed at low height that can recognise, monitor and count pairs of specific shoes coming in and out of the bus or train? People flows recognised, no GDPR risk.

This is not science fiction. My team at *The Go-Ahead Group* managed to run a pilot using this technique back in 2019. After a trial period, we established how we could change the fleet of buses in certain routes and save costs. We called it 'Project Cinderella'.

https://simplerchange.co.uk/project-cinderella

Fare Evasion Detection

How many times have you said, "I wish I could identify passengers who fail to validate their tickets or evade payment".

Well, let's get some surveillance cameras equipped with computer vision and AI that can spot and register individuals bypassing barriers or using invalid passes.

Yes, regulations may be complex to navigate, but the technology is there.

Crowd Management

Worried about monitoring crowd density at stations, platforms, or inside vehicles?

Cameras and AI models can detect crowded areas, estimate people density and send alerts to operators, managers or authorities that can then manage foot traffic or deploy additional vehicles, enhancing passenger safety and comfort.

Suicide prevention

Unfortunately, suicides happen. And they tend to follow a pattern that can be recognised by AI using footage and algorithms. A suspicious passenger at the end of a platform? With computer vision in place, AI can ‘understand’ the situation, decide that an incident may be about to happen, and trigger an alarm to station staff that can respond to help.

Accident and Incident Detection

Similarly, AI-powered cameras on station platforms can detect if someone falls onto the tracks, fights, or accidents in real-time, and trigger an emergency response, improving safety and enabling faster incident resolution.

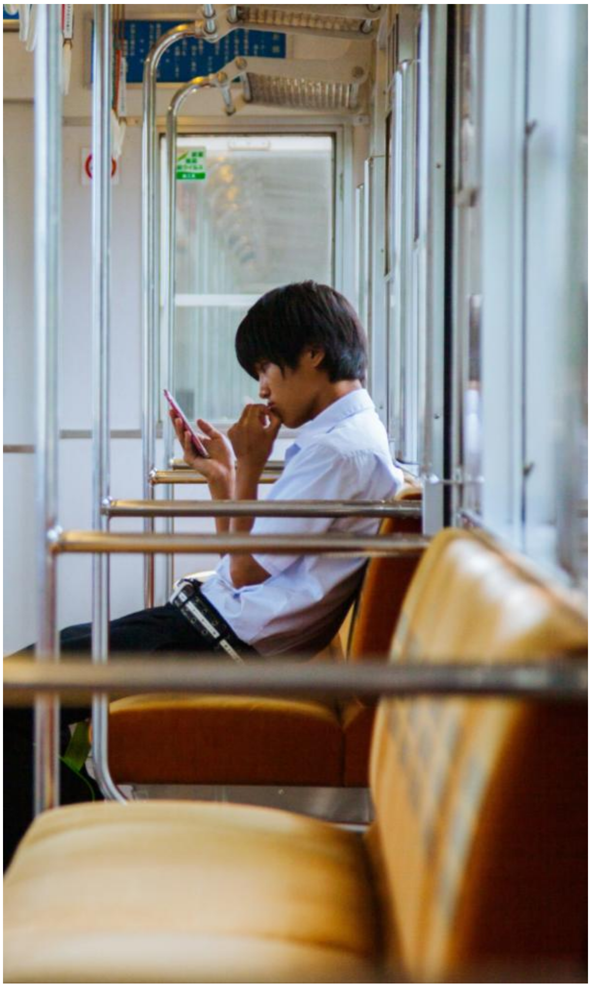
Potholes?

Who does not have potholes in their local roads? Unfortunately, these can lead to accidents, even deaths (e.g. motorbikes).

This could be helped by an amazing use of computer vision: if we install cameras on the lower side of our buses, these can capture video of the roads. AI can then recognise a potholes, alerting the local Council of the need to repair. AI could even classify them into low, medium or high risk, depending on size, depth and position, helping local authorities prioritise work.

Lost or Suspicious Object Detection

Worried about identifying unattended bags or forgotten belongings? A bag looks lonely or has not been moved for 10 minutes? AI-powered cameras can use computer vision to spot these bags and flag station staff or security individuals, improving security and helping the recovery of lost items for passengers.



Driver Monitoring

Worried about driver’s fatigue, distraction, or improper behaviour? Cameras inside the cabin can analyse the driver's eye movement and posture, alerting them if drowsiness is detected, enhancing safety for passengers and reducing accident risks. Issues with GDPR? Let’s just use real time data and not store it…

License Plate and Vehicle Recognition

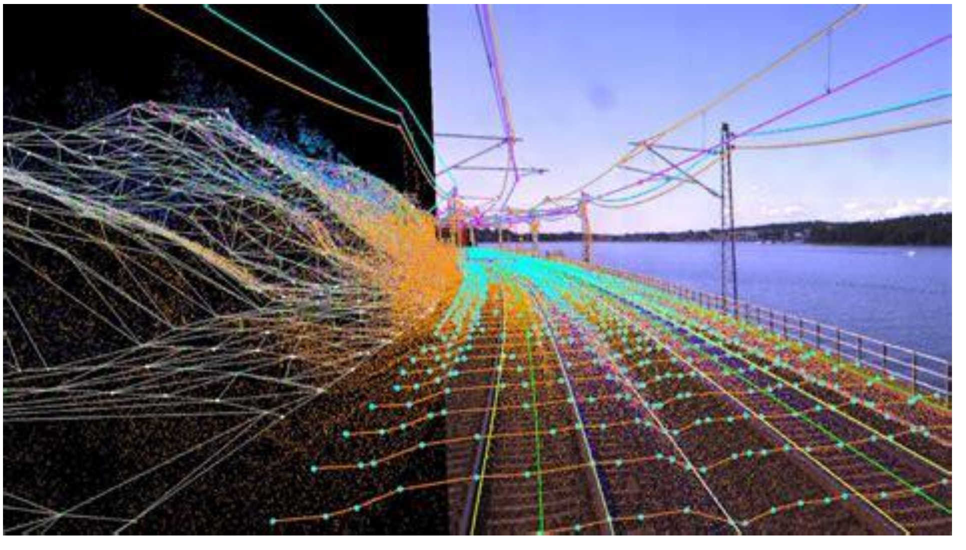
Need to identify unauthorised vehicles on dedicated bus or tram lanes? Cameras can be equipped with ANPR (Automatic Number Plate Recognition) and AI software to enforce rules by identifying violators and automatically issue penalty notices.

LIDAR

LIDAR (Light Detection and Ranging) is a technology that uses laser light to measure distances and create detailed 3D maps of an area. LIDAR offers us an extra layer of possibilities within AI.

Traffic Flow Analysis and Signal Prioritisation

AI can use LIDAR for traffic flow analysis and prioritisation of traffic lights. LIDAR systems installed on buses or stations can monitor traffic conditions in real-time, helping improve scheduling and routing. It can also detect approaching buses or trams and provide real-time signal adjustments to prioritise public transport at intersections, adjusting traffic lights dynamically. In heavily congested cities, this could significantly reduce congestion and pollution.



Design of Routes

LIDAR mapping can significantly improve the design of public transport routes, especially in areas with complex geography, by providing highly detailed and accurate data about the environment through 3D maps with precise information about the terrain, including elevation changes, slopes, and natural obstacles like rivers, or hills.

Infrastructure Monitoring

Computer vision and LIDAR is actively used by train and track operators like Network Rail for inspecting tracks for vegetation encroachment, analysis of the actual rail track or bridges, looking for cracks and other signs of degradation, or for dangerous wear and tear of overhead cables.

Passenger Counting and Monitoring

If you don’t feel like Cinderella, LIDAR is also an option, where AI can just count ‘forms’ instead of people.

Collision Avoidance

LIDAR can provide continuous scanning to detect potential collisions and activate emergency braking systems.

Pollution Control

Perhaps my favourite, LIDAR can be used to analyse air quality around transport hubs to evaluate and mitigate the environmental impact of public transport systems.

2 Computer Audio

It may not sound like there could be many uses for computer audio, but speech recognition and audio processing could help operators significantly.

Voice-Controlled Ticketing Systems

Let's face it. Ticketing kiosks are not always particularly user friendly. But this could easily be changed by allowing passengers to interact with ticketing kiosks using voice commands. A passenger can say, "One ticket to downtown," and the system will process the request and issue the ticket instead of navigating menus. This would also enhance accessibility for visually impaired users.

Virtual Assistants at Stations

Similarly, AI-powered kiosks or mobile apps can provide real-time travel information via voice interaction, improving user experience and assisting non-tech-savvy or elderly passengers.

Accessible Public Transport for Hearing Impaired

Speech recognition systems can convert spoken announcements into text subtitles for passengers, by allowing audio-to-text conversion of announcements displayed on digital screens. Similarly, they can be exported to mobile apps, making public transport more inclusive for hearing-impaired individuals.

Noise Monitoring and Cancellation

AI can detect excessive noise levels or specific sounds (e.g., glass breaking, shouting) through microphones installed in stations or vehicles, triggering alerts to maintenance or security personnel. Similarly, AI-powered microphones can recognize distress calls or alarms in stations and trigger emergency response.

Multilingual Support for Passengers

One of my favourites: systems can translate and deliver announcements in multiple languages using speech recognition and synthesis. A traveller can ask for directions in Spanish, with the system providing audio guidance in their language.

Sound-Based Navigation for Visually Impaired

AI can use computer vision or beacons and speech synthesis to guide passengers to platforms or exits, providing audio cues to visually impaired passengers, helping them navigate stations or vehicles. This will improve accessibility and independence for visually impaired users.

Language Processing for Customer Support

AI chatbots can provide real-time answers to schedule questions or ticketing issues in multiple languages, improving accessibility and customer satisfaction.

3 Electronic nose (e-nose)

Yes, computers can now ‘smell’. This is achieved using devices that mimic the way our noses detect smells: sensors ‘sniff’ out the different gases or odours in the air and then AI processes the data to identify or classify those smells. Useful, yes?

Air Quality Monitoring

Sensors installed in buses, trains, train stations, or even the street, can detect pollutants, CO2 levels, and other harmful gases and decide if there is a need for activating ventilation, air purification, or to trigger an alarm.

Identifying Hazardous Materials

Ever wondered why sometimes we are stopped in airports and swept with a small cloth that then goes into a machine? Airports use a form of e-nose combined with AI to detect hazardous chemicals, explosives, or flammable substances in luggage or passengers.

In critical situation where needed, E-noses can be deployed at stations and vehicles to help identify suspicious odours, such as those from explosives or chemical leaks.

Maintenance and Diagnosis

E-noses can also be used for monitoring odours associated with equipment malfunctions (e.g., overheating or fuel leaks). Sensors can detect abnormal odours from train engines or braking systems, indicating the need for immediate maintenance. AI could also trigger alerts or alarms to specialised personnel with tools to contain the issue.

Waste and Odour Management.

Worried about unpleasant odour in public transport carriages, toilets or garbage disposal areas? E-noses can monitor restrooms and other facilities and notify staff when odours exceed acceptable levels. AI could even design a solution to design the right scent to create a pleasant environment in passenger areas.

Alcohol and Drugs.

Worried about alcohol or drugs? Need to monitor food or alcohol-free areas? E-noses can also monitor environment looking for food odours, alcohol or drug odours in areas where these are prohibited, or on passengers or drivers.

4 Electronic Taste (E-tongue)

By now you will have guessed this: yes, computers can now also 'taste'. E-tongue, or electronic tongue, is a device that works like a digital version of our sense of taste. It uses special sensors to detect and analyse the chemical composition of liquids, such as food, beverages, or water, to identify flavours or measure properties like sweetness, bitterness, sourness, and saltiness.

Public Health Monitoring

E-tongue can detect harmful substances in passenger environments, by analysing substances spilled or present in restrooms or seating areas for potential health risks and trigger an alert to maintenance or security.

Similarly, E-tongue can monitor the quality of drinking water provided in public transport systems by analysing water for pH levels, contaminants, or unusual taste profiles.

Spill and Contamination Detection

Similarly, it can help analyse chemical spills or unusual substances in public areas or public transport vehicles, looking for acidic, basic, or contaminated liquids spilled in buses, trains, or stations.

Food and Beverage Quality Monitoring

Serving food and beverages on public transport like long distance trains and worried about how to test the quality of onboard food and beverages? E-tongues can detect spoilage or contamination in food items, preventing foodborne illnesses and maintaining high standards of service.

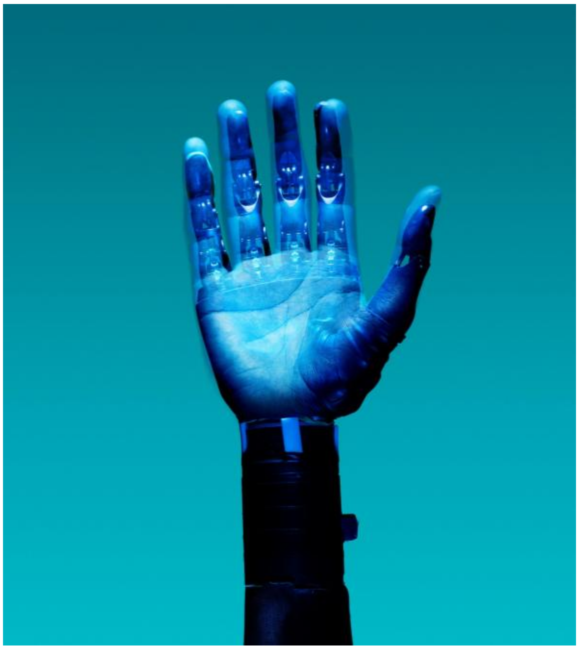
E-tongues can also ensure the consistency of coffee, tea, or other beverages served on long-distance trains or buses.

Innovative Food Services

This one is certainly my favourite: e-tongue can play a valuable role in creating new food dishes by providing precise, data-driven insights into flavour profiles, ingredient interactions, and overall taste balance. E-tongue can break down the flavours of existing dishes into measurable components, such as sweetness, bitterness, umami, saltiness, and sourness. Through customer feedback, it can propose new flavours and support chefs developing new dishes based on customer feedback.

5 Tactile sensors

Tactile sensors are devices that mimic the sense of touch, allowing machines or robots to detect and measure physical interactions, like pressure, texture, force, or vibration. Essentially, tactile sensors allow technology to "feel" and respond to physical contact, much like human skin does.



Pressure Sensors on Seats

Sensors in seats detect occupancy and weight distribution, sharing updates with passengers via mobile apps.

Haptic Feedback in Virtual Assistance

Haptic cues can be included on a wristband or a mobile phone to help passengers find their platform or bus location by vibrating at key points.

Enhanced Driver Assistance Systems

Already used on cars, tactile feedback mechanisms can alert drivers, by vibrating haptics on the steering wheel vibrates when the driver drifts out of a lane or fails to notice an obstacle.

The 'red button'

For those out there scared of the 'red button' on buses (will I alight at the wrong stop?), a 'virtual stop request' can be used to provide haptic feedback to passengers, signal that the next stop is their stop.

Touch-Responsive Ticketing Machines

Ticketing kiosks and machines equipped with tactile sensors can respond to touch input for ticket purchases or information, detecting pressure and adjust sensitivity for accurate inputs.

Accessible Interfaces for Visually Impaired

Braille touch panels and tactile feedback systems can enable visually impaired passengers to interact with transport interfaces. For example, ticket vending machines or navigation kiosks can include Braille and haptic[1] feedback for input confirmation.

[1]Haptic is defined by the Merriam-Webster dictionary as 'relating to or based on the sense of touch'. Mobile Phones uses this term for the different functionalities that we can obtained from our phone depending on the intensity of the touch. Haptics can enhance significantly our tactile capabilities.

6 Body Awareness

Proprioception in humans refers to the awareness of body position and movement. The technological equivalent, Motion and Position Sensors like accelerometers and gyroscopes, is widely used in public transport systems to enhance safety, efficiency, and passenger experience.

Vehicle Stability and Control

Sensors like accelerometers and gyroscopes can detect sharp turns or sudden stops in buses or trains and adjust braking or suspension systems, even report unusual or erratic driver behaviour, enhancing passenger comfort and preventing accidents.

Tilt and Inclination Detection

Sensors in trams or funiculars monitor tilt to ensure safe operation on steep inclines, preventing derailments and enhancing safety on challenging routes.

Collision Avoidance Systems

Already used in high end cars, ultrasonic or radar sensors on buses or trams can detect the relative position of the vehicle in relation to other nearby vehicles or obstacles, such as pedestrians, or cyclists. Collision avoidance systems can determine whether they are in too close proximity and trigger automatic breaking if necessary, reporting the situation for future learning.

Platform Alignment Assistance

Sensors in trains can measure their position relative to the platform and adjust as needed for safe boarding.

Door Operation and Safety

Still relying on the human eye to clear a vehicle for movement? Think again: sensors can monitor whether doors are fully open or closed and detect obstructions during closure, preventing injuries and ensuring smooth boarding and alighting.

Passenger Counting and Weight Distribution

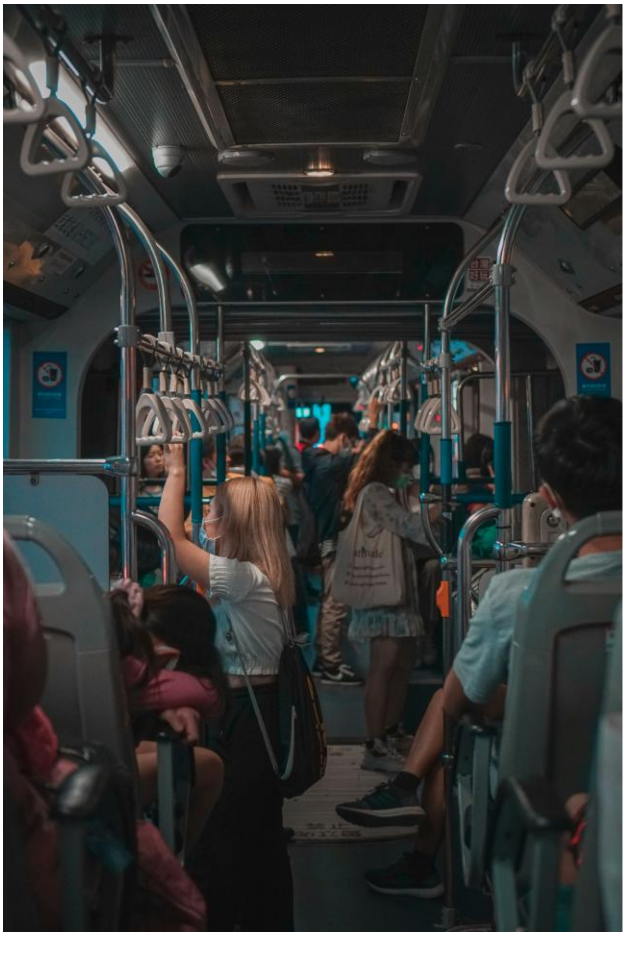
Load sensors detect the weight in each section of a train or bus, helping prevent overloading and imbalance, enhancing safety and ensuring compliance with capacity limits. This sensors can trigger an alert to the driver, to stop moving the vehicle until the situation is rectified.

Suspension and Comfort Monitoring

Motion sensors in buses detect uneven surfaces and dynamically adjust suspension to minimize jostling.

Maintenance and Diagnostics

Sensors can track the wear and movement of wheels, axles, or engines, detecting anomalies like misalignment or vibration.



7 Cognitive Intelligence (Higher Processing)

Just like a human, all these sensors need higher processing functions like reasoning, decision-making, and learning. AI is designed to emulated human cognitive senses, which we can use in public transport systems to enable smarter, more efficient operations.

Route Optimisation and Scheduling

AI models can analyse traffic patterns, passenger demand, and operational constraints and through predictive algorithms, dynamically adjust bus or train schedules during rush hours or delays, minimising waiting times and improving efficiency.

Similarly, AI models can analyse passenger flow, preferences, and behaviours to predict peak travel times and allocate more vehicles or staff at busy stations.

Fraud Detection

AI models can establish patterns and detect suspicious activities or fare evasion. For this, neural networks analyse travel patterns to flag potential fare-dodging behaviours, such as irregular tap-ins at gates cross-boundaries.

Dynamic Pricing Systems

Machine learning algorithms can adjust fares in real time based on demand, time of day, or route popularity, helping balances demand and encouraging off-peak travel.

Disaster and Emergency Planning

AI can support simulations of various disaster scenarios to plan evacuation and recovery strategies, like modelling the impact of floods or storms on the railways, enhancing resilience and preparedness for emergencies.

Multimodal Transport Coordination

AI models can optimise connections between different modes of transport, ensuring seamless transitions between buses, trains, and bike-sharing services

Personalised Recommendations

Most probably my favourite of all. In 2025, we do not just use what we have handy (e.g., DVDs). In 2025 we are used to have personalised experiences (e.g., Netflix). Humans are driven by different criteria: some want speed, some comfort, some cost, even health or the environment. Sometimes we may want to go through a place or to avoid that place. AI can deliver tailored travel recommendations to passengers, learning about their behaviours and patters and offering alternate routes or less crowded buses based on passenger preferences and habits.

This would be critically important for many in times of disruption when live feeds could help AI suggest sensible and working alternatives to the one not available.

8 Motor Control (Robotics)

Slightly more ‘science fiction’ at the minute than AI, but the science of robotics is also being developed at pace, with good potential uses in public transport.

Automated Cleaning Robots

Own a Roomba? Robotic systems clean stations, buses, and train compartments autonomously.

Platform Gap Assistance

Robotic systems can deploy ramps or bridges to cover gaps between trains and platforms for wheelchair users.

Baggage Handling and Delivery

Motorised baggage robots can follow passengers to their destinations within airports or large stations, reducing strain on passengers and speeding up movement through transit hubs.

Automated Boarding Systems

Robots can control boarding gates or assist passengers during boarding, using motorised barriers that open and close dynamically to manage crowd flow and ensure safety.

Delivery Robots in Stations

Small motorised robots can navigate station concourses to deliver meals ordered through an app.

Emergency Response Robots

Robots can assist in emergency situations, such as evacuations or firefighting, or carrying defibrillators to the place of the emergency.

Motorised robots equipped with cameras and sensors could also navigate smoky environments to locate stranded passengers.

Dynamic Signage and Wayfinding

Mobile robots can guide passengers to platforms, exits, or other areas, moving dynamically within stations, pointing passengers toward their destinations using screens and motorised gestures.

Last-Mile Robotic Transport

Small robotic vehicles (pods or scooters) can provide last-mile connectivity for passengers.

Automated Ticket Validation

Robotic arms can validate tickets by scanning barcodes or tapping cards when boarding buses or trains.

Crowd Control Robots

Robots with motorised systems manage crowd flow during peak hours or events, Mobile robots could use gestures, lights, and voice commands to direct passengers or form temporary barriers, preventing overcrowding and enhancing passenger safety.

Robotic Maintenance and Inspection

Robots equipped with motorised tools can perform repairs and inspections on vehicles and infrastructure where it is difficult for humans. Used in the space station, robotic arms can inspect train undercarriages or replace damaged components with precision.

How to Grasp the Opportunity

Implementing artificial intelligence (AI) in your organisation can unlock significant value, from increased efficiency to improved decision-making and enhanced customer experiences. However, delivering a successful AI requires careful planning and execution.

1 Clearly Define Objectives

Always start with the 'why': Identify the specific problems or opportunities that you want AI to solve or capture. Think deeply about the need and what would be a priority need. Whether it is enhancing customer insights, making operations more effective or cheaper, or automate repetitive tasks, always start with the 'why', never with the 'what', and most definitely never with the 'how'.

2 Evaluate Your Data

We have seen how data is foundational to AI and how incomplete, confused or biased data can lead to 'AI chaos'. Before you think about the 'how', always ensure that you have access to high-quality, relevant, and sufficient data to train your AI models. Clean, structured, and accurate data leads to better AI performance. Invest in data preprocessing, cleansing, and labelling if needed.

This is also the time to address privacy concerns, ensure compliance with data privacy regulations.

3 Start Small with Pilot Projects

Rome was not built in a day. Grand statements like "implementing AI across the organisation" may sound cool, but beginning with a small, manageable project in a low-risk area that demonstrates AI's potential benefits is likely to bring better outcomes. Examples include automating simple tasks like data entry or generating insights from customer data.

This is also the right time for defining clear metrics to evaluate the pilot's performance and measure success.

4 Build the Right Team

This is one of the most critical decisions that you will need to make: do I outsource, do I hire, or do I upskill my own talent?

Successful AI implementation requires skilled professionals, including data scientists, machine learning engineers, and domain experts. The decision is not easy, and it will depend on the quality of the existing resource and the availability of external resource.
Initially, we would most probably create cross-functional teams that include technical experts, business leaders, and end-users from both within the organisation and external. As mentioned in the AI recipe section, having an experienced fractional leader to support and mentor the team on a part time basis, could bring the external knowledge and experience at a relatively low cost.

5 Leverage Existing AI Tools

Reinventing the wheel is rarely the solution to a problem. There are great off-the-shelf AI solutions or cloud-based AI services such as Google Cloud AI, Microsoft Azure AI, or AWS AI that will do the job nicely. By using them we should be able to go faster and most probably reduce costs.

Customise only when required by specialised business needs, where possible leveraging open-source frameworks like TensorFlow.

5 Focus on Change Management

Early engagement of stakeholders is critical. Explain the benefits and objectives of AI initiatives to key stakeholders early on, ensuring their buy-in and support

Addressing employee concerns early is also critical. Where possible, we should proactively manage fears about job displacement. However, job displacement is always a possibility with AI, and we should consider reskilling opportunities for employees.

You can find plenty of information and tips for change here:
https://simplerchange.co.uk/simplifying-change

7 Invest on Infrastructure

There are 2 key pieces of infrastructure that your CIO must consider for AI solutions:

- Scalable computational power to support heavy AI workloads.
- Robust data storage solutions that can handle large datasets while maintaining data integrity and security.

8 Monitor and Iterate

AI is not a one-off exercise. In fact, in 2025, development of AI solutions is still pretty much in the R&D category.

AI is not a one-off exercise. In fact, in 2025, development of AI solutions is still pretty much in the R&D category. AI models degrade over time as data and environments change. Collect feedback from end-users and stakeholders, monitor performance regularly and retrain models to maintain accuracy and relevance.

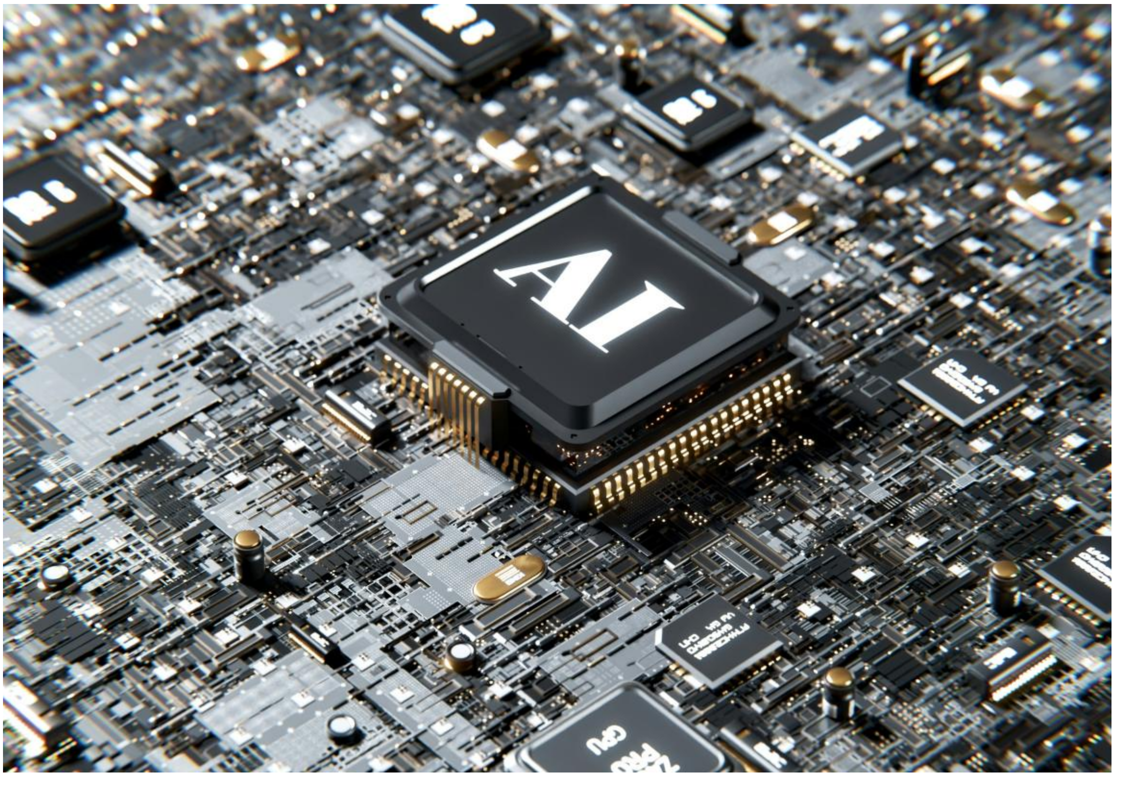
9 Emphasise Training and Adoption and Prepare for Challenges.

AI implementation may face hurdles, such as resistance to change, high costs, or integration difficulties. Often these hurdles are based in human's natural fear of new technologies. Addressing these proactively with clear communication, realistic budgets, and phased rollouts will help. Always couple it with train employees to understand and use AI tools effectively.

10 Prioritise Ethics and Transparency

Always develop AI solutions that provide clear, understandable reasoning behind their decisions, particularly for critical applications like hiring, healthcare, or finance.

AI Ethics will pay in the long run.



Why Simpler Change?

“I do not believe that you can do today's job with yesterday's methods and be in business tomorrow."
Horatio Nelson Jackson, physician and automobile pioneer.

In the rapidly evolving landscape of artificial intelligence, organizations need more than just technology; they need a trusted advisor to guide them through the complexities of AI adoption and implementation. Our approach as an AI advisors is rooted in a unique combination of hands-on expertise, strategic insight, and the ability to deliver meaningful change in diverse environments.

Practical Experience in AI Implementation

With extensive real-world experience leading AI initiatives, at Simpler Change we understand that success comes not only from technical prowess but from the ability to apply AI to solve real business challenges. From crafting data-driven strategies to implementing predictive analytics and automation tools, we have a proven track record of bridging the gap between AI's potential and its practical application.

Deep Change Management Expertise

AI adoption is as much about people as it is about technology. Our background in change management ensures that organizations are equipped to navigate the cultural, operational, and leadership shifts required to integrate AI effectively. Whether facilitating stakeholder buy-in, upskilling teams, or reshaping workflows, we enable seamless transitions that maximise ROI and minimise resistance.

Cross-Sector Experience

Having worked across industries including retail, construction, manufacturing, and transport, we bring a broad perspective to AI strategy. Each sector has unique challenges and opportunities, and our ability to tailor AI solutions to specific contexts ensures outcomes that are impactful and sustainable. This versatility allows us to anticipate roadblocks and unlock opportunities others might overlook.

Access to a Network of Specialists

No single person can solve every problem, especially in a field as vast as AI. Our extensive network of AI specialists, including data scientists, engineers, ethicists, and business strategists, allows us to bring the right expertise to the table when needed. This collaborative approach ensures that clients receive the highest-quality insights and solutions.

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