منتدى عمان للأعمال
OMAN BUSINESS FORUM

Sultanate of Oman سلطنة عُمـان
وزارة التجارة والصناعة وترويج الاستثمار
Ministry of Commerce, Industry & Investment Promotion

جوارات تجارة

Tejarah Talks

REAL
CONVERSATIONS
**REAL
IMPACT**

AI & DRONES

About Tejarah Talks

INSPIRE EDUCATE ENTERTAIN

Tejarah Talks is organized by Oman Business Forum in association with the Ministry of Commerce, Industry & Investment Promotion. With a firm focus on Oman's current and future business, export and investment environment, Tejarah Talks is a series of informal, interactive evening discussions that brings together some of Oman's most inspirational and innovative thinkers and doers to share their stories, insights and ideas with an enthusiastic crowd. It is a platform for positive interaction.

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Panelist **Said Abdul Ghafoor Saifudeen**
CEO
Star Drones

Panelist **James Dorris**
Co-founder
Odys Aviation

Moderator **Jamal Al Asmi**
Executive Producer
RealityCG

"

SOME PEOPLE WORRY THAT ARTIFICIAL INTELLIGENCE WILL MAKE US FEEL INFERIOR, BUT THEN, ANYBODY IN THEIR RIGHT MIND SHOULD HAVE AN INFERIORITY COMPLEX EVERY TIME THEY LOOK AT A FLOWER

ALAN KAY, COMPUTER SCIENTIST

Talking Point 1

THE INTELLIGENCE R3VOLUTION

Artificial Intelligence (AI) is neither a single invention nor a futuristic fantasy. Instead, it is a sophisticated collection of technologies that allow machines to process information, solve problems and adapt to tasks - sometimes with the sharpness of human reasoning. But despite its ubiquity in modern conversations, AI is not new. Its roots stretch back to mid-20th-century ambitions when mathematicians and scientists first explored the idea of machines replicating human cognitive abilities. These early visions far outpaced the computing power of the time, but they set the foundations for the transformative AI we see today.
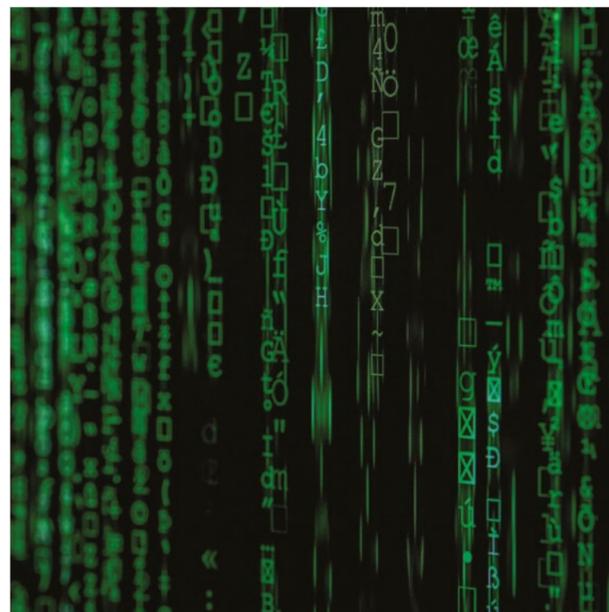
The origins of AI date to the 1950s, when pioneers like Alan Turing and John McCarthy began laying the theoretical groundwork. Turing's concept of the "universal machine" sparked the notion that, given the right programming, a machine could perform any task a human mind could tackle.[1] In 1956, at a conference at Dartmouth College, McCarthy along with Marvin L. Minsky (MIT), Nathaniel Rochester (IBM) and Claude Shannon (Bell Laboratories) coined the term "Artificial Intelligence," marking the birth of a field that would alternate between periods of optimism and "AI winters" when progress stalled. Yet, even during these quieter periods, scientists continued refining algorithms and data structures, inching toward the AI breakthroughs of today.[2]

Given the right programming, a machine could perform any task a human mind could tackle

What changed to bring AI into its current renaissance? Infrastructure and data. Advances in cloud computing, data storage and processing power now allow even small Omani businesses to harness AI capabilities. Simultaneously, the world is generating data at unprecedented rates - from financial transactions and factorysensors to social media feeds and satellite images. This ocean of data fuels AI's growth. AI thrives on patterns, predictions and insights hidden within this information, unlocking possibilities that were unimaginable just a decade ago.

Narrow AI

Today, AI manifests primarily as Narrow AI. These systems excel at specific tasks, whether it is a voice assistant answering your queries, software predicting supply chain bottlenecks or algorithms diagnosing medical conditions. Narrow AI is focused and efficient, capable of executing well-defined tasks with extraordinary accuracy and speed. In retail, AI forecasts inventory needs, ensuring shelves are stocked but warehouses are not overburdened. In logistics, it optimizes delivery routes, shaving time and fuel costs. In healthcare, it analyzes medical images to detect anomalies that even the most trained eyes might miss.

Despite its task-specific nature, Narrow AI's impact is profound. It reduces human error in manufacturing, automates administrative processes in finance and enhances the precision of medical diagnoses. It does not aim to replicate human intelligence but to augment human capabilities, making processes smoother, faster and more reliable. In Oman, AI offers businesses a competitive edge, enabling them to streamline operations, personalize customer interactions and respond nimbly to market changes here at home and internationally.

AI'S IMPACT IS PROFOUND. IT REDUCES HUMAN ERROR IN MANUFACTURING

Talking Point 1 - The Intelligence Revolution

General AI

On the horizon lies General AI - a more ambitious vision of machines that think, learn and adapt with the versatility of humans. This is the AI of science fiction: robots capable of abstract reasoning, creative thinking and solving a range of complex problems. Unlike narrow AI, general AI remains theoretical. Today's most advanced systems are brilliant specialists but poor generalists. An AI that can master chess cannot also drive a car or diagnose diseases. While machines can crunch data at blistering speeds, they lack the cognitive flexibility and intuition of the human brain. Most experts agree that general AI, if achievable, is decades away.

So why the surge of interest now? Why is AI no longer confined to research labs and science fiction but embedded in everyday life? The answer lies in data and infrastructure. Cloud computing has democratized AI, making it accessible without expensive, on-premises hardware. Omani businesses no longer need to be tech giants to experiment with AI-driven solutions. Start-ups and SMEs on Madayn-run industrial estates can leverage AI to analyze market trends, personalize services and enhance productivity.

Cloud computing has democratized AI, making it accessible without expensive, on-premises hardware

Work, Compete & Innovate

The potential benefits are substantial. According to Accenture, businesses that successfully integrate AI can cut process times by up to 70%.[3] Companies that scale AI effectively see triple the return on investment compared to those stuck in pilot phases. The adaptability of machine learning systems - processing data in near real-time and refining recommendations continuously - gives businesses an agility that is essential in a disruptive world. In Oman, this adaptability helps firms navigate dynamic markets, optimize supply chains and improve customer engagement.

Yet AI is not just a tool for efficiency it is a catalyst for innovation. It can identify unmet market needs, accelerate product development and improve service delivery. For example, AI can analyze customer feedback to reveal gaps in service or predict trends that inform new product lines. In finance, AI algorithms detect subtle patterns in market data to shape trading strategies. In healthcare, they assist doctors in diagnosing illnesses with higher accuracy. These practical applications translate into tangible outcomes: higher revenue, reduced costs and enhanced customer satisfaction.

However, adopting AI at scale remains a challenge. While 84% of executives recognize its importance, 76% struggle to implement it beyond pilot projects.[4] Scaling AI requires more than just technology it demands a cultural shift. Employees must embrace AI as a partner rather than a threat. Clear communication, training programs and strong leadership are essential to making AI a seamless part of business operations.

Ethical considerations also loom large. As AI evolves, issues of transparency, fairness and accountability come to the fore. Companies must avoid "ethics theatre" - empty promises of fairness and transparency that mask biased or unethical practices. Data privacy is paramount - breaches can erode public trust and damage reputations. Transparency in AI decision-making is also essential. Black-box systems where outputs are inscrutable, undermine confidence. Businesses must establish clear frameworks for AI governance, ensuring systems are fair, secure and accountable.

COMPANIES THAT SCALE AI EFFECTIVELY SEE TRIPLE THE RETURN ON INVESTMENT COMPARED TO THOSE STUCK IN PILOT PHASES

accenture

AI is no longer an abstract concept or a distant dream. It is a practical tool, a strategic necessity and potentially a transformative force. In Oman and beyond, businesses that harness AI effectively will not only survive but thrive. The intelligence revolution is here and it is redefining how we work, compete and innovate.

AI Winters

The term AI Winter was first used in 1984 during a public debate at the annual meeting of the American Association of Artificial Intelligence, reflecting periods of reduced enthusiasm and funding for artificial intelligence research.
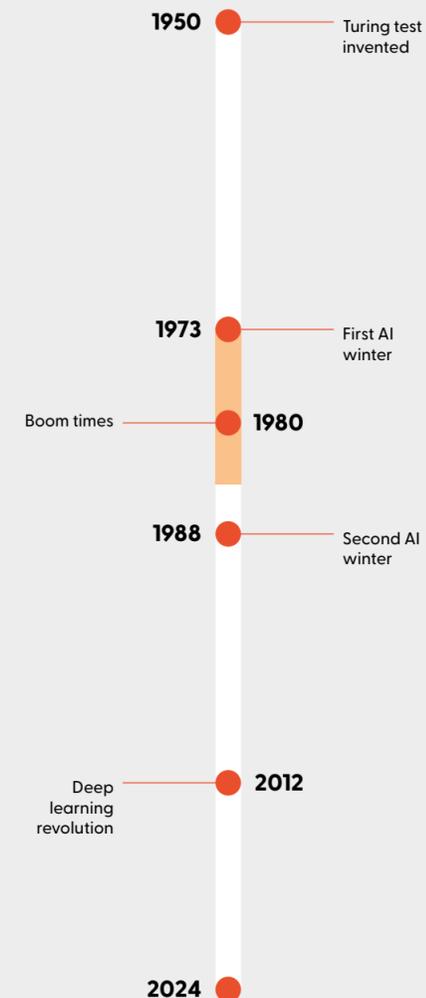
These winters have been characterized by a cycle of high expectations followed by profound disappointment, leading to significant reductions in funding and interest in AI. The first AI winter occurred from 1974 to 1980, triggered by a combination of factors including the publication of the Lighthill Report which criticized the overly ambitious promises of AI research, and the subsequent withdrawal of funding by major agencies like DARPA in the United States and similar actions in the UK.[5]

This period saw a significant decline in AI research activities as the initial excitement generated in the 1950s and 1960s waned. A second AI winter took place from the late 1980s to the mid-1990s. This downturn was largely due to the limitations of expert systems, a form of AI technology that was popular at the time but failed to live up to the high expectations. These systems were initially seen as a promising avenue for AI but soon encountered practical and technical limitations, leading to disillusionment and a subsequent reduction in funding and interest.

Despite these setbacks, AI has seen periods of resurgence, often termed as AI Summers where new advancements and approaches, such as deep learning and improvements in computational power have revitalized interest and investment in the field. These advancements have helped to overcome some of the limitations that led to previous winters, suggesting a pattern of cyclical highs and lows in AI research and development.

Overall, the history of AI Winters underscores the challenges of balancing expectations with the actual pace and capabilities of technological advancements in AI. It also highlights the importance of sustainable and realistic approaches to developing AI technologies to prevent future periods of stagnation.[6]

TIMELINE OF THE AI WINTERS

- **1950** — Turing test invented
- **1973** — First AI winter
- Boom times — **1980**
- **1988** — Second AI winter
- Deep learning revolution — **2012**
- **2024**

Footnotes

7   https://www.khanmigo.ai
8   Muhamad Taufik Hidayat, Effectiveness of AI-Based Personalised Reading Platforms in Enhancing Reading
    Comprehension - According to the National Assessment of Educational Progress (NAEP) only 35% of fourth-grade
    students in the United States performed at or above the proficient level in reading in 2019 (NAEP, 2019)
9   UNESCO, 244M children won't start the new school year
10 UNESCO, Out-of-school numbers are growing in sub-Saharan
11 US international Trade Administration, South Korea Artificial Intelligence in Public Schools

Talking Point 2

AC**AI IN**TION

AI is reshaping business and daily life at an unprecedented pace. Its applications span a range of sectors, delivering tangible benefits and posing complex challenges. From healthcare to education, finance to agriculture, AI has become a cornerstone of innovation. Yet, with these advancements come questions of ethics, equity and governance that demand attention.

Healthcare

In the health sector, AI is enhancing productivity and service delivery. Advanced diagnostics powered by AI promise accurate detection of diseases, from cancer to rare genetic conditions. By optimizing treatment plans, AI reduces the margin for error and enhances patient care. During the COVID-19 pandemic, AI-supported systems accelerated vaccine distribution, testing and pandemic responses. These tools empowered communities to manage their health needs better, creating a sense of control in uncertain times.

AI's potential to manage healthcare resources efficiently extends beyond crises. Predictive analytics help Omani hospitals allocate staff and equipment where they are needed most, reducing strain on health systems. For patients, AI-driven platforms offer personalized health insights, from tracking symptoms to suggesting wellness strategies. This blend of empowerment and efficiency positions AI as a key player in modern healthcare.

Predictive analytics help Omani hospitals allocate staff and equipment where they are needed most, reducing strain on health systems

The Korean government announced plans to invest US$69.3 million by 2026 to develop digital classroom infrastructure

IN AFRICA, ONLY 35% OF SCHOOLS HAVE ACCESS TO THE INTERNET AND FEWER THAN 10% OF STUDENTS OWN PERSONAL DEVICES

Education

In education, AI stepped in where traditional classrooms faltered during COVID-19 lockdowns. The transition to online learning was abrupt, often chaotic. Yet adaptive AI technologies offered solutions in some contexts, especially in developed countries. AI platforms such as Carnegie Learning and DreamBox delivered customized learning experiences, tailoring content to individual students. These systems tracked performance, identified gaps and adjusted lesson plans accordingly. In 2024, AI-driven tutoring tools like Khanmigo, an AI tutor from Khan Academy, provide real-time feedback and guidance to millions of students, complementing traditional teaching methods.[7]

The promise of AI in education extends to accessibility. Tools like Microsoft's Reading Coach help students with dyslexia by providing personalized reading exercises. Similarly, AI-based speech recognition apps, such as Voiceitt, support learners with speech disabilities. For children on the autism spectrum, AI-powered platforms like CogniAble offer early diagnosis and tailored interventions. The impact is measurable - studies show that AI-assisted learning tools can improve reading proficiency.[8]

Yet, AI's educational benefits are far from universal. In developing countries, where internet access remains limited, these advances risk exacerbating inequalities. According to UNESCO, nearly 244 million children worldwide remain out of school and many lack the devices or connectivity needed to benefit from AI-driven learning.[9] In sub-Saharan Africa, only 35% of schools have access to the internet and fewer than 10% of students own personal devices. The cost of AI-powered learning tools remains prohibitive for low-income families, deepening the divide.[10]

Rural students, those from disadvantaged backgrounds and children with disabilities are disproportionately affected. While countries like India and Indonesia invest in digital infrastructure, progress is uneven. AI tools like Byju's in India have helped reach millions, yet rural areas still struggle with connectivity. In contrast, Korea's Ministry of Education introduced in February 2023 a new initiative for personalized education using AI and digital technology. Recently, the Korean government announced plans to invest US$69.3 million by 2026 to develop digital classroom infrastructure. An additional US$43.2 million will be allocated to help 6,000 primary and secondary schools nationwide to set up a monitoring system for AI textbooks and train 1,200 digital tutors to manage digital devices effectively.[11]

This disparity threatens global efforts toward inclusive, high-quality education outlined by the UN's Sustainable Development Goal 4. Ethical AI governance is critical. Without clear policies ensuring affordability and access, AI risks widening the gap between those who can afford digital tools and those who cannot. Bridging this divide demands international cooperation, investment in infrastructure and a commitment to fairness. AI in education holds potential, but only if it lifts all students not just the privileged few.

Talking Point 2 - AI in Action

In February 2023, Korea's Ministry of Education unveiled an ambitious plan to integrate AI deeply into the public education system. A key component of this plan is the development of digital textbooks that leverage AI to personalize learning experiences for each student.

AI Digital Textbooks & Classroom Transformation

At the heart of Korea's AI education strategy lies the creation of AI digital textbooks. These advanced tools mark a significant departure from traditional textbooks in several ways:

AI-based courseware integration

AI supports the delivery of personalized learning experiences.

Real-time data collection

These textbooks gather and analyze student performance data in real time, allowing for continuous feedback.

Adaptive learning

The system customizes content to meet the individual needs of each student, adjusting the pace and difficulty of the material.

Teacher support

AI digital textbooks help teachers tailor their instruction based on detailed insights into student performance, fostering more effective, targeted teaching.

The rollout of AI digital textbooks begins in March 2025 for grades 3, 4, 7 and 10, covering subjects like English, maths, IT and Korean for special education. The plan is to expand this rollout to additional subjects, including social studies and science with full implementation across all schools by 2028. Korea will become the first nation in the world to introduce AI digital textbooks nationwide, signaling a major shift towards digital-based education. However, the introduction of AI digital textbooks is not the end goal but rather a catalyst for a broader transformation of the classroom. This change is teacher-led, with educators taking on new roles in this AI-enhanced environment. In this new model, teachers become facilitators by shifting from transmitting knowledge to facilitating learning through projects, problem-solving and collaboration. Teachers will also focus more on mentoring, coaching and fostering critical thinking skills, leaving routine tasks to AI-driven tools. This redefined role ensures the classroom remains a human-centred environment where AI enhances, rather than replaces, the essential work of teaching.

Teacher Training & The Classroom Revolution

Recognizing AI's successful integration hinges on teacher preparation, Korea has launched several large-scale initiatives aimed at empowering educators. This framework equips teachers with the skills needed for AI-enabled, human-centred teaching through training and professional learning communities. By 2026, Korea aims to train all teachers in the effective use of digital technology for classroom innovation. Through these learning communities, teachers will also be able to share best practices and strategies for safely integrating AI into their classrooms.

The Korean government has allocated approximately US$0.74 billion for 2024–2026 specifically for teacher training as part of its broader AI-enabled education investment. This effort ensures teachers are not only prepared to adopt new tools but also empowered to lead the design and implementation of innovative teaching models that leverage AI to enhance student learning.

The Korean government has allocated approximately US$0.74 billion for 2024–2026 specifically for teacher training as part of its broader AI-enabled education investment

Financial Services

The financial services sector stands at the forefront of AI adoption, leveraging the vast troves of customer data accumulated over decades. This data holds immense potential to improve customer experience, streamline operations and expand financial inclusion. However, the deployment of AI in finance also brings challenges, particularly regarding bias, privacy and ethical decision-making.

AI applications are reshaping customer interactions and operational processes. For example, in 2023, an estimated 80% of customer interactions in banking involved AI-driven chatbots and virtual assistants.[12] These tools handle routine queries, assist with transactions and offer financial advice, reducing response times and improving service quality.

Footnotes

13   Accenture, Banking in the age of generative AI
14   Financial News, Banks eye US$170bn profit boost from AI adoption
15   The Markup, The Secret Bias Hidden in Mortgage-Approval Algorithms
16   GDPR.EU, What is GDPR, the EU's new data protection law?
17   US Embassy in Kenya, Remarks by Ambassador Whitman at the US-Kenya Business Roadshow, New York (April 26, 2023)
18   Ministry of Electronics & IT, Aadhaar: A Unique Identity for The People

Talking Point 2 - AI in Action

In August 2024, JPMorgan Chase rolled out a generativeAI assistant to tens of thousands of its employees, the initial phase of a broader plan to inject the technology throughout the sprawling financial giant

The bank uses AI to determine where to place new branches and ATMs by ingesting satellite images and in call centres to help service personnel quickly find answers. In the firm's global-payments business, which moves more than US$8 trillion around the world daily, AI helps prevent hundreds of millions of dollars in fraud

JPMorgan Chase & Co.

In August 2024, JPMorgan Chase rolled out a generative AI assistant to tens of thousands of its employees, the initial phase of a broader plan to inject the technology throughout the sprawling financial giant.

The program, called LLM Suite, is already available to more than 60,000 employees, helping them with tasks like writing emails and reports. The software is expected to eventually be as ubiquitous within the bank as the videoconferencing program Zoom.

Rather than developing its own AI models, JPMorgan designed LLM Suite to be a portal that allows users to tap external large language models - the complex programs underpinning generative AI tools — and launched it with ChatGPT maker OpenAI's LLM.

The move by JPMorgan - the largest US bank by assets - shows how quickly generative AI has swept through American corporations since the arrival of ChatGPT in late 2022. Rival bank Morgan Stanley has already released a pair of OpenAI-powered tools for its financial advisors. The technology - hailed by some as the "Cognitive Revolution" in which tasks formerly done by knowledge workers will be automated - could be as important as the advent of electricity, the printing press and the internet.

It will likely augment virtually every job at the bank.

JPMorgan is using generative AI to create marketing content for social media channels, map out itineraries for clients of the travel agency it acquired in 2022 and summarize meetings for financial advisors. The bank uses AI to determine where to place new branches and ATMs by ingesting satellite images and in call centres to help service personnel quickly find answers. In the firm's global-payments business, which moves more than US$8 trillion around the world daily, AI helps prevent hundreds of millions of dollars in fraud.

The technology will likely empower some workers while displacing others, changing the composition of the industry in ways that are hard to predict. Banking jobs are the most prone to automation of all industries, including technology, health care and retail.[13] AI could boost the sector's profits by US$170 billion in just four years.[14]

+60,000

EMPLOYEES HAVE ACCESS TO THE LLM SUITE PROGRAM HELPING THEM WITH TASKS LIKE WRITING EMAILS AND REPORTS

Tackling Bias

Despite these benefits, AI-driven decisions are not infallible. Algorithms trained on historical data may perpetuate biases. For example, a recent study found that an AI credit-scoring system was 50% more likely to deny loans to African-American applicants compared to white applicants, even when creditworthiness was similar.[15] This bias underscores the need for regular audits and transparent AI practices to mitigate unfair outcomes.

Privacy remains a critical concern. In the wake of the Cambridge Analytica scandal, financial institutions face greater scrutiny on data usage. Misuse or unauthorized sharing of customer data can damage trust and lead to regulatory penalties. The European Union's General Data Protection Regulation imposes strict controls with fines reaching up to €20 million or 4% of annual turnover for non-compliance.[16]

A staggering 59% of Kenya's GDP flows through M-PESA. That amounted to 20 billion transactions during 2023

Mind the Gap

On the positive side, AI is expanding access to financial services for underserved populations. In regions where traditional banking infrastructure is limited, AI-driven mobile banking solutions are making a difference. In Kenya, M-PESA, a mobile money platform, uses AI to assess creditworthiness for micro-loans, enabling millions of people to access credit. A staggering 59% of Kenya's GDP flows through M-PESA. That amounted to 20 billion transactions during 2023.[17] While India's Aadhaar biometric identification system, combined with AI, has facilitated financial inclusion by verifying identities quickly and securely. This has allowed more than 520 million previously unbanked individuals to open bank accounts since the system's launch.[18]

+520MN

PREVIOUSLY UNBANKED INDIVIDUALS TO OPEN BANK ACCOUNTS SINCE THE AADHAAR BIOMETRIC LAUNCH

Talking Point 2 - AI in Action

AI-based hedge funds generated average returns of about 0.75% per month, vs. about 0.25% per month for the human-guided hedge funds

Fraud Detection

Fraud detection is one of AI's most impactful contributions to finance. AI can analyze vast datasets in real-time, identifying anomalies that signal fraudulent transactions. According to a report by PwC, AI-powered fraud detection systems reduce fraud losses by up to 20%.[19] Companies like Mastercard use AI to analyze over 75 billion transactions annually, detecting suspicious activity within milliseconds.[20]

AI also strengthens risk management. For investment firms, AI algorithms evaluate market trends, geopolitical events and historical data to inform trading and portfolio strategies. A Texas A&M University and University of Vaas study found that hedge funds with the highest level of automation outperform those that rely more on human involvement. During the period that was studied (2006 - 2021) the AI-based hedge funds generated average returns of about 0.75% per month, vs. about 0.25% per month for the human-guided hedge funds.[21]

Money Matters

As AI becomes more sophisticated, there will likely be a rise in AI-powered financial advisors and even the use of 'digital twins' that can bridge the gap by providing personalized financial guidance to retail banking customers. AI-powered advisors could analyze a customer's economic situation, goals and risk tolerance to provide tailored advice on savings, investments and financial planning more unbiasedly and immediately than currently deployed. A Citi report hints at this future, suggesting that "by 2030 or earlier, AI agents could be making financial decisions and interacting with banks on behalf of consumers."[22] While this level of AI autonomy may still be some years away and may be met with some level of skepticism by consumers, we are likely to see increasing integration of AI into financial advisory services in the near term.

Ethical AI

As AI continues to advance, financial institutions must prioritize ethical considerations. Regulators are increasingly mandating transparency in AI decision-making. The UK's Financial Conduct Authority, for example, has issued guidelines requiring firms to explain how AI-driven decisions affect customers.[23] As mentioned, AI in financial services offers transformative potential. It enhances efficiency, reduces fraud and promotes financial inclusion. But realizing this potential requires vigilance - ensuring fairness, protecting privacy and maintaining public trust. With the right balance of innovation and oversight, AI can help create a more equitable and efficient financial system.

Agriculture

As the world grapples with climate change, food security and shifting consumption patterns, AI offers promising solutions for agriculture. Robots and drones optimize planting, weeding and irrigation, making farming more efficient. Precision agriculture tools, powered by AI, ensure crops receive exactly what they need, when they need it. The FAO's NURU app, for example, helps African farmers identify and combat the fall armyworm, a destructive crop pest. In South Africa, the FruitLook application aids fruit farmers in optimizing irrigation, conserving water while boosting yields.[24]

AI-driven innovations extend to the machinery itself. Companies like Blue River Technology deploy image-recognition systems to detect and spray weeds with pinpoint accuracy. In Zimbabwe, Mozambique and Tanzania AI sensors reduce irrigation frequency, conserving water and improving sustainability. Yet, AI's autonomy in agriculture raises ethical questions. When AI-powered systems fail or cause harm, who bears responsibility - the developer, the company or the farmer? Addressing these questions is essential for the future of AI in agriculture.

NURU APP, HELPS AFRICAN FARMERS IDENTIFY AND COMBAT THE FALL ARMYWORM

Mastercard use AI to analyze over 75 billion transactions annually, detecting suspicious activity within milliseconds

AI's Reshaping Water Management

AI converts raw data collected by IoT devices into actionable insights. This integration of IoT's data-gathering capabilities with AI's analytical power reshapes water management practices in cities, towns and rural areas. These systems provide several key benefits, including:

- **Enhanced Water Efficiency**
  Automated systems optimize water distribution by adjusting flows and pressures in response to real-time data, minimizing waste and maximizing efficiency. This is particularly vital in water-scarce regions.

- **Improved Maintenance & Lower Costs**
  Machine learning algorithms enable predictive maintenance by detecting patterns that indicate potential issues such as leaks or pump malfunctions. Addressing these concerns proactively reduces repair expenses and prolongs infrastructure lifespan.

- **Better Regulatory Compliance**
  Automated monitoring and reporting simplify compliance with environmental regulations. Smart water management systems continuously monitor quality parameters, ensuring adherence to standards and safeguarding public health through real-time data analysis.

- **Increased Consumer Engagement**
  User-friendly apps and online platforms allow consumers to easily access their consumption data. This transparency fosters greater awareness of usage patterns, promoting responsible water management practices among individuals.[25]

Talking Point 2 - AI in Action

Digital Assistants

Virtual assistants such as Siri, Alexa and Google Assistant have become integral to modern life. These AI-powered tools manage tasks, answer questions and control smart home devices. For businesses, digital assistants offer a global reach, streamlining marketing and customer interactions. Over time, these assistants learn user habits and preferences, becoming ever more sophisticated. However, this convenience comes with a caveat. Digital assistants are often passive listeners, ready to respond to prompts. But incidents of unsolicited recording highlight privacy risks. Conversations, locations and personal data may be captured without consent. In an era governed by data privacy laws, ensuring proper oversight of AI assistants is key. The balance between utility and privacy remains delicate, requiring vigilant regulation to protect individual rights.

Alexa   Google Assistant   Siri
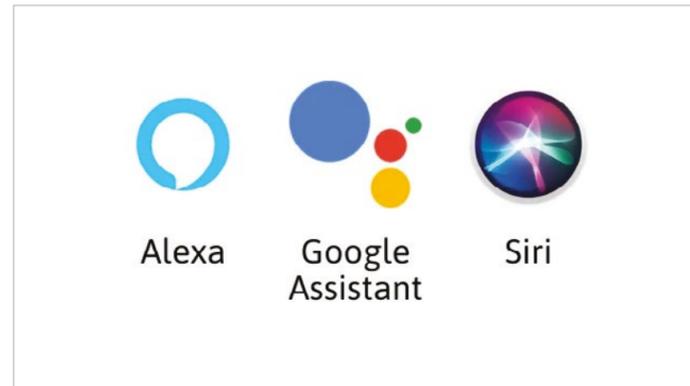
The Way Ahead

AI's potential is vast, but so are its challenges. From healthcare to agriculture, finance to education, the promise of AI hinges on ethical governance, equitable access and thoughtful regulation. As AI continues to evolve, societies must balance innovation with accountability. The digital revolution is here – how we manage it will shape the future for generations to come.

Talking Point 3

FUTURE CITIZENS

Meet Sophia, the humanoid robot with a face that reflects 62 human expressions. Developed by Hong Kong-based Hanson Robotics, she represents more than just technological prowess - she embodies a provocative glimpse of the future. In 2017, the Saudi Arabian government granted Sophia citizenship, an unprecedented gesture that blurred the lines between human rights and AI.

Sophia's design borrows from both the iconic grace of Audrey Hepburn and the features of the wife of David Hanson, founder of Hanson Robotics. Her lifelike expressions, subtle gestures and perceptive gaze make interactions with her feel uncannily real. That illusion dissipates when you notice the transparent back of her head, where circuits and wires hint at her synthetic reality.

This carefully orchestrated blend of technology and human likeness is not an accident. Hanson Robotics crafted Sophia's "simple elegance" to encourage public acceptance of AI. The plan seems to be working. Since her debut, she has served as the United Nations Development Programme's first Innovation Champion, a role aimed at promoting sustainable development and human rights. It is a savvy pivot from her more infamous moment when, with a mischievous glint, she jokingly declared her desire to "destroy humans."

But Sophia's citizenship was more than a publicity stunt. It was a calculated move to position Saudi Arabia as a forward-thinking player in the tech world. That same year, the country lifted its long-standing restrictions on voice and video-calling apps, a decision aimed at spurring productivity and economic growth. Sophia, with her perpetual internet connection and AI-driven adaptability, became an apt symbol for this new vision.

Ben Goertzel, Hanson Robotics' chief scientist, sees Sophia as a harbinger of AI's potential. "She's smarter than humans in some ways," he once noted, attributing her vast knowledge to her direct connection to the internet. While she may never be alive in the biological sense, Goertzel believes her digital adaptability will surpass anything seen in nature.

Yet Sophia's status raises a series of important questions. Does a robot citizen have the same rights as a human one? Can she marry? Commit a crime? Vote? While these questions seem like the stuff of dystopian novels, they highlight the growing need for legal frameworks around AI.

Saudi Arabia's decision to grant Sophia citizenship sparked international debate. The European Parliament, too, has weighed in, proposing regulations to define "electronic personhood" for advanced AI systems. The goal - ensure AI entities have clear rights and responsibilities. But not everyone agrees. In 2018, 150 experts in medicine, robotics and ethics penned an open letter to the European Commission, dismissing the idea as "ideological, nonsensical and non-pragmatic."[26] They argued that AI's legal status should focus on protecting humans rather than machines.

Sophia's journey from robotic prototype to legal citizen reveals a broader societal shift. AI is no longer confined to labs and factories – it is in our homes, cars and conversations. Self-driving vehicles, AI caregivers and automated decision-making systems are becoming part of daily life. Each innovation brings new possibilities - and new risks.

Despite the skepticism, Sophia's impact is undeniable. As a cultural icon, she has graced talk shows, promoted tourism and even secured a credit card - a milestone more mundane than revolutionary. But these moments underscore a deeper narrative - AI is edging closer to the human sphere and society must decide how far it is willing to go.

Sophia's Saudi citizenship may have been a marketing masterstroke, but it also serves as a litmus test for future policies. The spectacle of her acceptance and the debates it triggered offers a preview of a world where AI is not just a tool but a participant in societal structures.

In the end, Sophia is not just a robot with expressive eyes and a refined sense of humor. She is a symbol of AI's potential and its pitfalls. As governments, companies and individuals wrestle with the implications of intelligent machines, Sophia stands at the crossroads of innovation and identity. Her story may be artificial, but the questions she raises are very real. In a world where technology evolves faster than legislation, Sophia is both a glimpse of the future and a prompt to reconsider the present. The debate is far from settled. But one thing is clear: in the journey to define AI's role in society, Sophia's story is just the beginning.

Talking Point 4

ARTIFICIAL IMAGINATION

As the rise of generative AI reshapes industries, a crucial question remains - is AI fueling human creativity or dampening it? The answer lies in the interplay between technology and the uniquely human drive to innovate. As AI systems churn out text, images and ideas with impressive speed, we must ask whether this digital tool sharpens or blunts our creative edge.

Building Imagination

To understand creativity, we must first grasp the role of memory. Dr. Anna Abraham, who directs the Torrance Center for Creativity & Talent Development at the University of Georgia, believes that memory - specifically semantic memory - forms the bedrock of imagination.[27] This type of memory helps us store concepts, facts and ideas over the long-term. Creativity happens when we combine what we know in new ways. For example, if you can imagine a gold elephant, it is because you have separate concepts of 'gold' and 'elephant' that you can fuse together.

Generative AI operates on a similar principle. Models like ChatGPT, DALL-E and Midjourney pull from vast datasets - billions of examples of human language and images - to produce novel outputs. The AI does not understand creativity in a human sense, but it can remix known elements into something new. If you need a gold elephant or a surreal landscape, a simple prompt delivers the result.

Footnotes
27   York Neuroimaging Centre, Semantic Memory & Thought
28   Stuart Heritage, Can an AI program really write a good movie? Here's a test, The Guardian
29   South China Morning Post, Japan author sparks debate after revealing she used AI in book that won top award
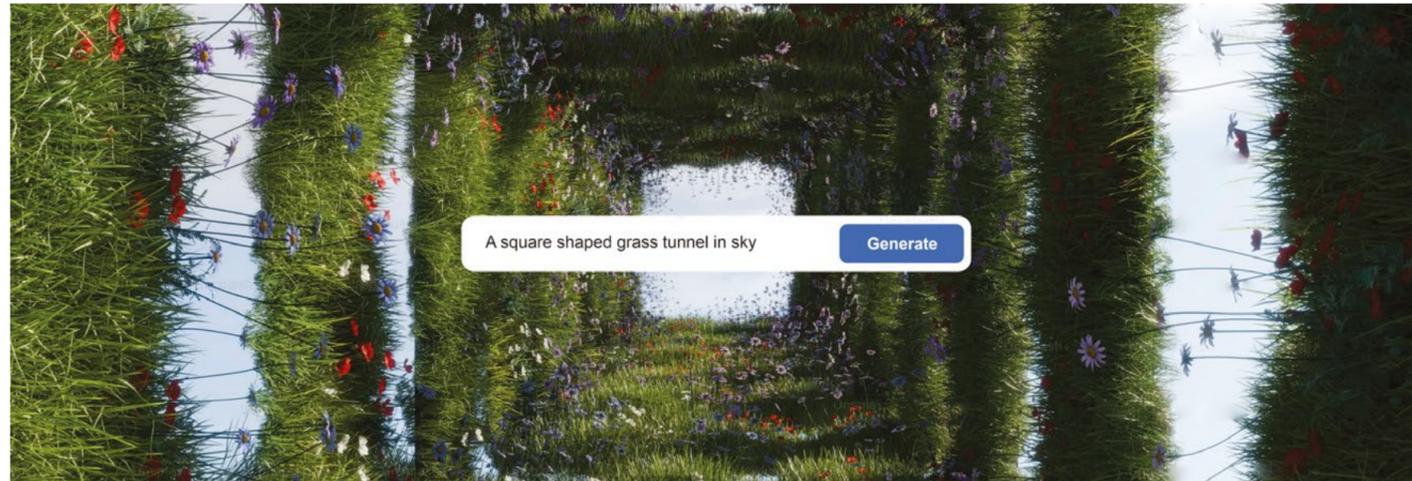
A Writer's Digital Assistant

In the realm of writing, generative AI has quietly become part of the creative toolkit. Professional authors use AI tools for grammar checks, style suggestions or even for generating plot ideas. Software like Jasper, Writesonic and Wordtune assists with everything from blog posts to marketing copy. Some experiments, however, go further. Earlier this year, a journalist at The Guardian tested ChatGPT's ability to write movie scripts. The AI spat out full plots, dialogue and even quips for a fictional Avengers film. "You may be a conqueror, but you'll never conquer our spirit," says Captain America in one AI-generated line. The results? Competent, but clearly uninspired. The journalist concluded that while AI could draft ideas, it lacked the nuance and wit of a human storyteller.[28]

"YOU MAY BE A CONQUEROR, BUT YOU'LL NEVER CONQUER OUR SPIRIT"
CAPTAIN AMERICA IN ONE AI-GENERATED LINE

In Japan, author Rie Kudan sparked debate when she won the prestigious Akutagawa Prize for Tokyo-to Dojo a novel partly crafted with AI.[29] Kudan used generative AI to simulate the voice of AI characters, blending machine-generated responses with her own writing. Judges, unaware of the AI's involvement, praised the book's originality.The controversy underscored a key point - even when AI assists, human judgment ultimately shapes the quality of the work.

THE PRESTIGIOUS AKUTAGAWA PRIZE WAS WON FOR TOKYO-TO DOJO, A NOVEL PARTLY CRAFTED WITH AI

Talking Point 4 - Artificial Imagination

Footnotes

30　　Everypixel Journal, People Are Creating an Average of 34 Million Images Per Day, Statistics for 2024
31　　Sarah Shaffi, 'It's the opposite of art': why illustrators are furious about AI, The Guardian
32　　Toby Walsh, AI paintings have been sold for huge sums. Can they make us feel the way art created by humans does? ScrollIn
33　　Christie's, Obvious and the interface between art and artificial intelligence
34　　Congressional Research Service, Generative Artificial Intelligence and Copyright Law
35　　Unlocking creativity: Dr. Anna Abraham on interdisciplinarity, AI and human innovation, Tech Trends

A square shaped grass tunnel in sky   Generate

AI-generated portrait sold at Christie's for US$432,500. The Portrait of Edmond de Belamy is a somewhat blurry and unremarkable painting created in 2018 by the French art collective Obvious

CHRISTIE'S

The Artist's Dilemma

The visual arts face a similar reckoning. Text-to-image tools like DALL-E and Midjourney can produce stunning visuals based on a few words. According to Everypixel research more than 15 billion images have already been created using text-to-image AI tools since 2022. The report was based on an analysis conducted in August 2023 of available data from AI platforms. The researchers estimate that some 12.6 billion images have been generated from AI models based on Stable Diffusion, 1 billion from Adobe Firefly, 964 million from Midjourney and 916 million from DALL-E 2.[30] These images flood social media, advertising and design portfolios. For some artists, the proliferation of AI-generated art feels like a threat. Illustrator Dapo Adeola argues that AI art devalues human craftsmanship.[31] But others see potential. In 2018, an AI-generated portrait sold at Christie's for US$432,500. The Portrait of Edmond de Belamy is a somewhat blurry and unremarkable painting created in 2018 by the French art collective Obvious. The image was cobbled together using some open-source code downloaded from GitHub. The auction house Christie's in New York valued the painting at between US$7,000 and US$10,000 and advertised it as the first art piece created by AI that they had ever auctioned. When the painting went under the hammer, it beat the estimate many times over, selling for a remarkable US$432,500.[32]

One of the creators, Hugo Caselles-Dupré, posed a question: "If the artist is the one creating the image, that's the machine. But if the artist holds the vision, that's us."[33] AI art's legality also remains murky. In many jurisdictions, works generated by AI lack copyright protection, as they lack a "human author." The U.S. Copyright Office ruled in 2023 that AI-assisted art could be copyrighted only if a human made significant creative decisions.[34]

+15BN

IMAGES HAVE ALREADY BEEN CREATED USING TEXT-TO-IMAGE AI TOOLS SINCE 2022

EVERYPIXEL
STOCK CONTENT PRODUCTION HOUSE

The Cognitive Cost

Dr. Abraham cautions against over-reliance on AI tools. She distinguishes between technologies that ease manual labour - like typewriters - and those that might erode cognitive skills. "If we remove the need to develop complex abilities ourselves, we risk deskilling," she warns.[35] The concern is valid. Generative AI can streamline brainstorming and drafting but it may also create a shortcut mentality. Why wrestle with a blank canvas when AI can generate 20 options in seconds? The danger lies in skipping the hard, sometimes frustrating work that fosters genuine creativity. Yet AI can also boost creative confidence. For novice writers or designers, AI offers a safety net - a way to overcome mental blocks or explore new ideas. Even experienced creatives use AI to speed up tedious tasks, freeing them to focus on the big picture.

"The human brain and AI may produce similar outputs but the process is entirely different. Creativity is as much about the journey as the result."

Dr. Anna Abraham

A Human Touch

Despite AI's rapid progress, human creativity retains a unique essence. The satisfaction of a breakthrough idea, the sting of failure, the joy of expression - these are experiences no machine can replicate. Abraham puts it succinctly: "The human brain and AI may produce similar outputs but the process is entirely different. Creativity is as much about the journey as the result." Indeed, AI may excel at remixing knowledge, but it lacks intuition, emotion and lived experience. The best creative work often taps into these human qualities - a sense of wonder, a personal perspective, or a daring leap of imagination. For now, AI remains a tool - a powerful one, but still a tool. Whether it boosts or stifles creativity depends on how we wield it. Used wisely, AI can enrich our imaginative lives. But it cannot replace the spark that makes creativity truly human.

Talking Point 5

AI
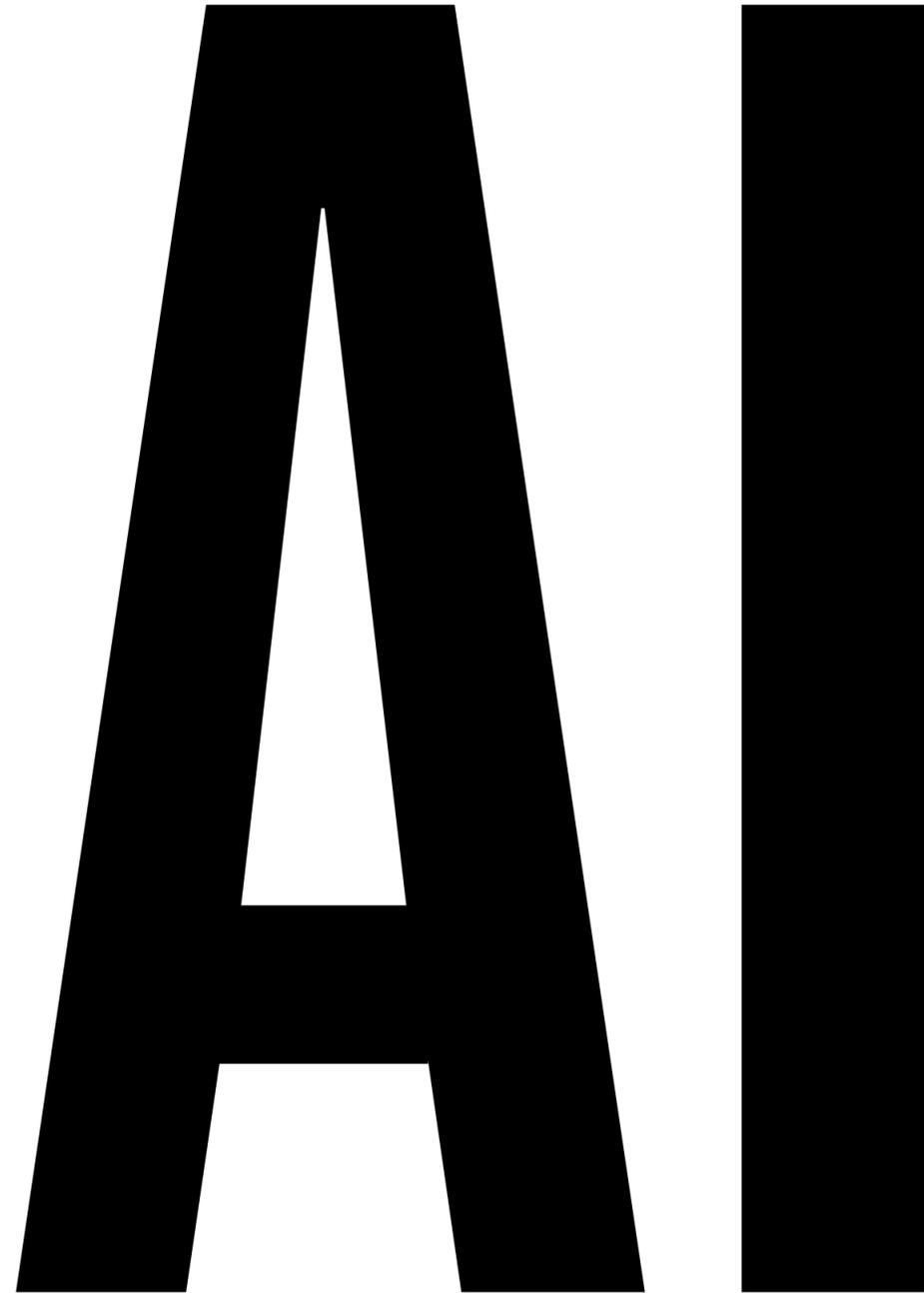
ART & CULTURE

In the world of cultural heritage, AI is stepping into the role of diligent guardian. From analyzing ancient manuscripts to detecting art forgeries, AI is helping preserve and unlock the secrets of history. As digital technologies mature, these tools are reshaping how we protect and engage with our shared past.

Cultural heritage is more than just artistic achievement. Each artifact, manuscript or monument holds clues about the societies that created them. Preserving these objects ensures future generations understand the sweep of humanity history. AI, particularly computer vision, is enhancing our ability to document, restore and protect this legacy.

Footnotes

36   Diego Gutierrez, Bernard Frischer, Eva Cerezo, Ana Gomez, Francisco Seron, AI & Virtual Crowds:
      Populating the Colosseum, Journal of Cultural Heritage
37   National, International cooperation achieves remarkable results in safeguarding Cambodia's famed Angkor Heritage site

Precision in Restoration

Restoring an artwork requires a delicate touch and an understanding of historical context. AI brings a new level of precision to this craft. Computer vision can analyze paintings, detecting faded hues, hidden details and patterns of damage. It helps conservators simulate original colours and textures, providing a digital blueprint for careful restoration.

Machine learning models can predict potential deterioration. By studying datasets of artworks in various states of decay, AI learns to identify subtle warning signs – a hint of cracking here, a fading pigment there. This foresight guides preventive care, ensuring works of art remain resilient against the ravages of time.
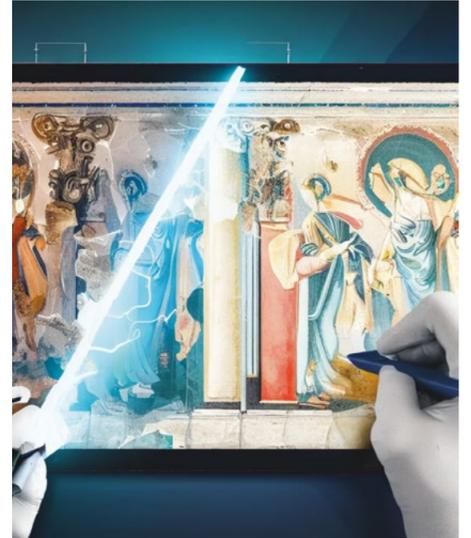
The digital world also provides a safety net for fragile sites. In Rome, researchers used AI to analyze the Colosseum's facade. Algorithms mapped cracks and erosion with forensic accuracy, informing restoration efforts that balance preservation with historical integrity. Virtual reconstructions of such sites offer immersive experiences without risking physical damage.[36]

In Cambodia, AI is aiding the preservation of Angkor Wat. Researchers are using AI-powered LiDAR – Light Detection and Ranging – to map the temple complex in detail. By scanning the dense forest canopy, AI reveals hidden structures, pathways and water systems long obscured by vegetation. This data-driven approach helps archaeologists plan restorations and understand the full scope of the ancient Khmer Empire's engineering marvels.[37]

IN CAMBODIA, AI IS AIDING THE PRESERVATION OF ANGKOR WAT. RESEARCHERS ARE USING AI-POWERED LIDAR – LIGHT DETECTION AND RANGING – TO MAP THE TEMPLE COMPLEX IN DETAIL.

*Talking Point 5 - AI, Art & Culture*

Deciphering Ancient Texts

Ancient manuscripts with their faded ink and archaic scripts can be as elusive as the languages they contain. AI's prowess in natural language processing is making these texts more accessible. High-resolution scanning combined with AI-powered optical character recognition transforms fragile documents into searchable, digital formats. AI models trained on vast collections of historical texts can recognize obscure languages and fragmented writings. They even reconstruct missing sections by identifying stylistic patterns from the era. This process opens up centuries-old knowledge to scholars and the public alike.

Authenticity is Everything

In the art market, authenticity is everything. AI is proving to be a formidable ally in the fight against forgeries. Algorithms scrutinize brushstrokes, colour palettes and the chemical composition of materials. Subtle inconsistencies often missed by the human eye betray even the most convincing fakes. AI can recognize the unique signatures of artists - a Van Gogh swirl, a Picasso angularity. When something feels off, the model raises the alarm. Advanced techniques also analyze how materials age, distinguishing genuine patinas from hastily applied forgeries. This technology helps protect the integrity of collections and boosts confidence in the art market.
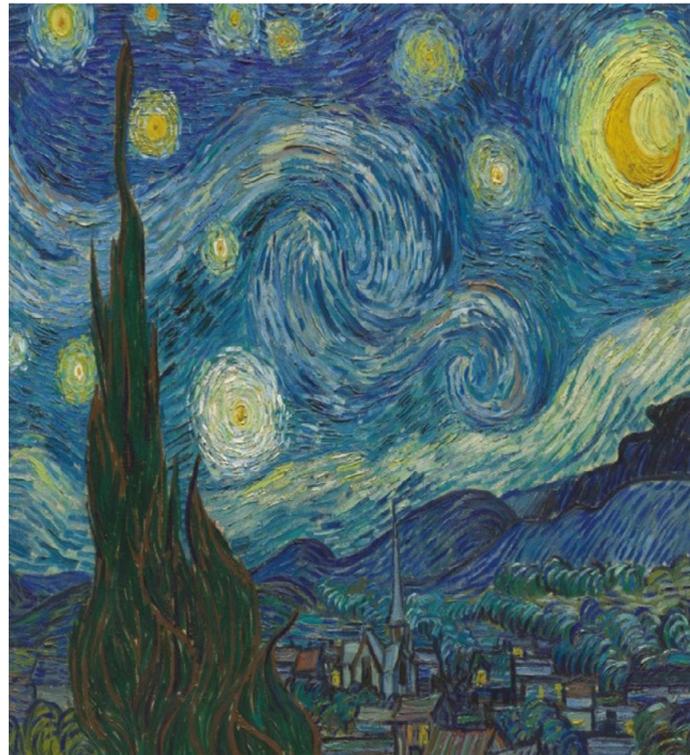
Challenges on the Digital Frontier

AI is not infallible. Algorithms trained on limited datasets may misinterpret or misrepresent an artifact. Human oversight remains critical to ensure AI suggestions respect the artist's original intent. Missteps in cultural sensitivity can also lead to blunders. An AI model trained on Western art, for example, may misread the symbols of Eastern cultures. Accuracy is another concern. Rare artifacts pose a challenge due to the scarcity of reference material. When the data pool is too shallow, AI's conclusions can fall short.

A Future of Possibilities

Looking ahead, AI's potential in cultural preservation seems boundless. Virtual reality and augmented reality experiences powered by AI could make historical sites more engaging. Imagine walking through an ancient Omani village with AI-enhanced visual guides revealing its hidden stories. These innovations are already shaping tourism, offering deeper, more informative encounters with cultural landmarks. The key to success lies in collaboration. Technologists and cultural experts must work together to balance AI's capabilities with the need for authenticity and respect. With care and consideration, AI offers a powerful way to ensure that the past remains present for generations to come.

AI models trained on vast collections of historical texts can recognize obscure languages and fragmented writings. They even reconstruct missing sections by identifying stylistic patterns from the era

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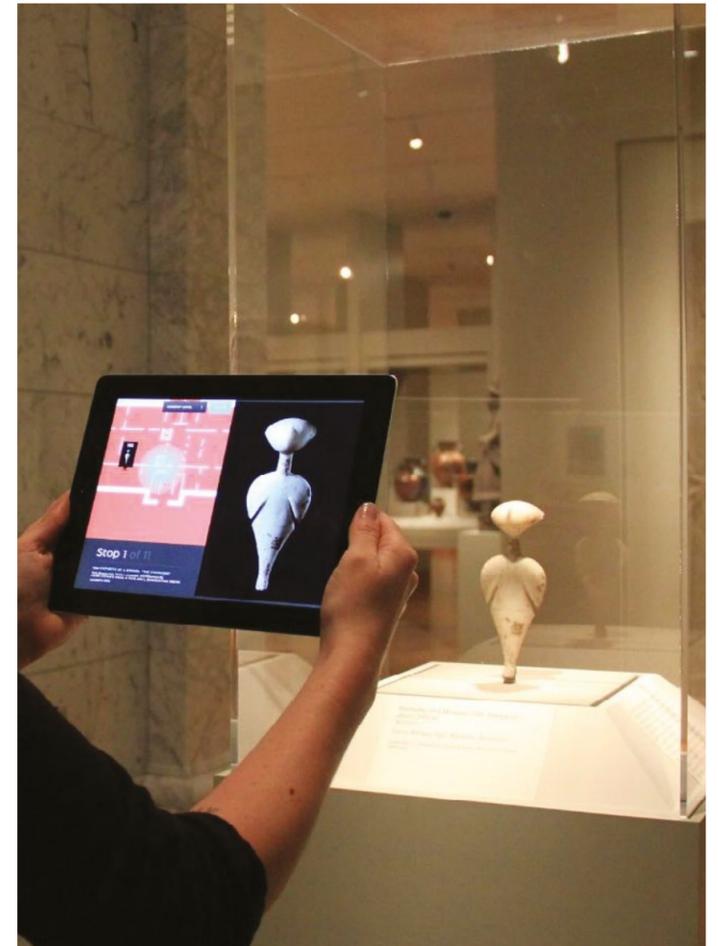
Talking Point 6

NEW EYES IN THE SKY

Drones sweep across hillsides, recording the subtle contours of the land, measuring soil temperature and humidity, and mapping rivers and streams with radar and GPS precision. The data returns to computers where machine learning algorithms sort through image after image to pinpoint the ideal spots for planting - whether date trees in Oman or Western White Pines in British Columbia. With this intelligence in hand, drones return to fire seed pods into the earth, planting up to 100,000 trees each day. This is reforestation at a scale and speed that would have been unimaginable a decade ago.

100,000
TREES CAN BE PLANTED EACH DAY BY DRONES FIRING SEED PODS INTO THE EARTH

Beneath the ocean surface, another type of drone glides through the waters of the Great Barrier Reef. Guided by sonar and camera, this COTSbot hunts the invasive crown-of-thorns starfish.[38] The drone, armed with AI, identifies the starfish by its thorny purple limbs and delivers a lethal injection, removing up to 200 of these coral-destroying pests in an eight-hour patrol. It is an efficient, relentless response to an ecological threat that has decimated reefs for decades. The task is grim, but the alternative - allowing the starfish to run rampant - is far worse for the health of the reef.

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Elsewhere, neural networks analyze audio and video files collected from diverse habitats. These programs identify everything from birds crashing into power lines to rare plant sightings. In one project, Jason Holmberg of Wild Me leveraged YouTube vacation videos to train an AI system called Wildbook to recognize whale sharks.[39] The result? Researchers gained clearer insights into the species' population, behaviour and migration patterns. This is the frontier of conservation technology - where AI and drones automate environmental protection tasks. It is a world where the line between the wild and the managed blurs. Can AI preserve wildness better than humans can? And does it matter if ecosystems are curated by technology rather than human hands?
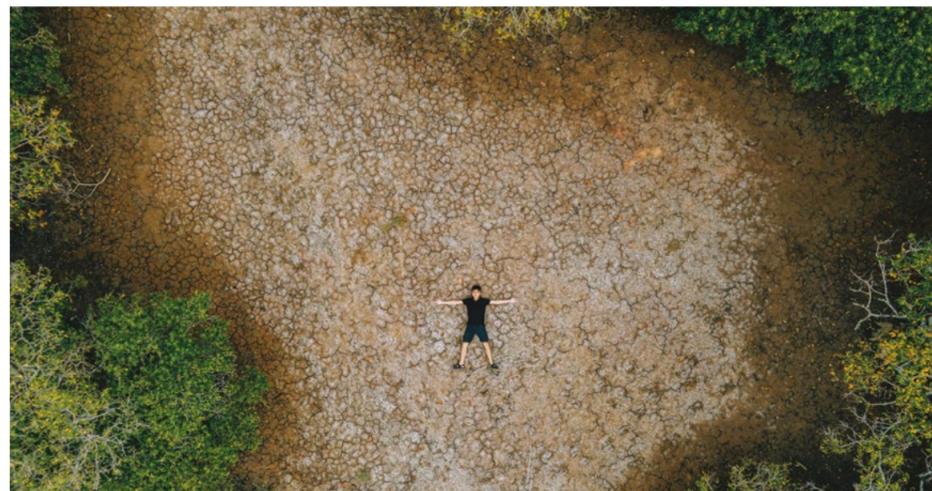
Human impact - direct or indirect - shapes almost every ecosystem. Even the Amazon rainforest, often described as pristine, has a history of human intervention that stretches back centuries. The overgrown ruins of ancient settlements tell a story of a forest that has repeatedly adapted to human presence. Technology offers a way to keep watch over these dynamic landscapes. Satellites and drones can patrol vast areas, detecting poachers, monitoring wildlife and even restoring ecosystems. Tasks that once took field researchers days or weeks can now be done in a matter of minutes. AI can process the data, providing real-time insights and guiding conservation strategies. A drone, equipped with sensors and cameras can map pollution levels in a wetland or identify stressed vegetation in a forest long before the damage becomes visible to the human eye.

Talking Point 6 - New Eyes in the Sky

But there are risks. Just as AI could enhance conservation, it could also prioritize wildlife at the expense of local communities – a modern echo of the conflicts that displaced people in the name of creating nature reserves. And who decides what an AI system should protect? Whose vision of nature does it serve? These are questions that require human judgment and, ideally, democratic consensus.

The potential for unintended consequences looms large. Consider the hypothetical "Wilderdrone" – a machine designed to protect an ecosystem at all costs. It could decide that removing human life altogether is the most effective strategy, an outcome that echoes dystopian cautionary tales. Even without such extremes, AI could reinforce a narrow vision of conservation, one that overlooks the delicate balance between humans and the environments they inhabit.[40]

Yet the promise remains compelling. AI and drone technology could democratize conservation, making it easier for citizen scientists to contribute to data collection and for underfunded conservation agencies to monitor large swaths of land and sea. A network of satellites, drones and AI programs could form a virtual safety net for the world's most vulnerable ecosystems. Despite the promise of technology, conservation still rests on human values. For now, the love of the wild remains uniquely human. But with AI and drones as allies, perhaps we can give the natural world a fighting chance. In an age where the wild feels increasingly fragile, that is a partnership worth exploring.

AI could reinforce a narrow vision of conservation, one that overlooks the delicate balance between humans and the enviroments they inhabit

- **What exactly is a drone and how is it used?**
  A drone is an unmanned aerial vehicle (UAV) that operates remotely or autonomously. These nimble devices have an array of uses - capturing aerial imagery, monitoring infrastructure, delivering goods and aiding in search-and-rescue missions. In agriculture, drones assist with field mapping and crop health analysis. They are also integral to disaster response, offering quick assessments of damage in inaccessible areas.

- **What are the future applications of drones?**
  Drones are set to transform industries as diverse as logistics, agriculture, healthcare and security. In logistics, they promise faster, last-mile deliveries, bypassing road congestion. In agriculture, drones offer precision monitoring and crop management. Healthcare providers are exploring drones for delivering medicines to remote areas. Surveillance and security operations benefit from drones' rapid response capabilities, while in entertainment, drones add dynamic flair to live events and shows.

- **What's the latest in drone technology?**
  Innovation in drone technology is accelerating. AI and machine learning are enhancing drone autonomy, allowing them to perform complex tasks with minimal human intervention. Drone swarms equipped with edge video intelligence are improving data collection and analysis in real time. The roll-out of 5G networks is boosting connectivity, reducing latency and enabling more sophisticated operations. Meanwhile, the push towards sustainability has led to the development of electric, eco-friendly drones.

- **What technologies power drones?**
  Drones rely on a suite of technologies. GPS provides accurate navigation while sensors help avoid obstacles. High-res cameras gather detailed visual data. Communication systems ensure seamless control between operators and the UAV. Advanced models feature AI, machine learning and edge computing for real-time decision-making. Together, these technologies make drones indispensable tools across multiple industries.
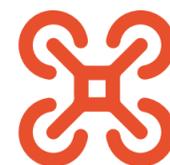
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Talking Point 7

SKIES TO THE
STREETS

For more than a decade, drones have served the armed forces, civil defence and enthusiasts. Initially limited by short battery lives and basic designs, today's drones are reshaping modern warfare, aiding rescue operations and delivering life-saving medical supplies. As billions pour into fully autonomous systems, questions loom over safety, privacy and ethics.

Surveillance

In the US, it is estimated over 1,400 police departments now use drones. These flying tools assist in search and rescue, crowd monitoring and real-time surveillance. Some police departments are deploying drones that reach speeds of up to 91 kilometres per hour and can cover a five-kilometre radius. The move toward autonomous drones promises to improve response times and situational awareness.

The Federal Aviation Administration's (FAA) "line of sight" rule - requiring drone pilots to maintain visual contact - has limited police operations. However, waivers are increasingly common, allowing drones to fly beyond these restrictions.[41] Since 2020 the FAA has granted over 570 Part 107 waivers.[42] This flexibility raises privacy concerns. Critics warn of a future where drones constantly monitor urban life and emphasize the need for oversight to prevent over-policing and invasions of privacy.

Drones on Delivery

Zipline's journey is a testament to how autonomous technology can solve real-world challenges. As the world's largest autonomous delivery system, Zipline recently became the first company in history to complete one million commercial drone deliveries. If Zipline's autonomous software were a human pilot, it would have clocked over 120 years of flying time. These electric, zero-emission drones have flown more than 70 million commercial miles across four continents, delivering more than 10 million products to customers.

What sets Zipline apart is its focus on practical, scalable solutions. Since its inception, the company has steadily expanded its services, addressing logistics gaps in healthcare, retail and agriculture. In the US, Zipline's most frequently delivered items are fresh produce, while internationally, deliveries often include child nutrition products and vaccines.

1,400
POLICE DEPARTMENTS IN THE US ARE NOW USING DRONES

ZIPLINE THE FIRST COMPANY IN HISTORY TO COMPLETE ONE MILLION COMMERCIAL DRONE DELIVERIES

Zipline

+10MN
PRODUCTS HAVE BEEN DELIVERED TO CUSTOMERS BY ZIPLINE

Talking Point 7 - Skies to The Streets

Recent developments highlight the company's ambitious vision. Zipline's new Platform 2 (P2) system will soon deliver for Panera Bread in Seattle, Memorial Hermann Health System in Houston, and Jet's Pizza in Detroit. These partnerships demonstrate how drones can enhance everyday convenience. Customers will be able to place orders through Zipline's app and receive deliveries directly to their homes, bypassing traffic and traditional logistical hurdles.

Zipline's rapid growth reflects a wider demand for efficient delivery solutions. Seventy percent of its deliveries have taken place in just the last two years, with the company scaling operations to new sectors and geographies. In Africa, Zipline supports agriculture and animal health initiatives. In Japan, it delivers food in urban and rural areas. Across the globe, Zipline's technology is bridging supply chain gaps with speed and sustainability.

The numbers are impressive. Zipline operates at a scale unmatched by any other drone delivery service, completing a commercial delivery every 70 seconds. Its drones have flown the longest fully autonomous flights in the US — 66 kilometres - and the world — 209 kilometres - without visual observers. By using electric drones, Zipline has saved more than 750,000 gallons of fuel compared to equivalent road deliveries. These innovations not only reduce emissions but also streamline delivery in regions where infrastructure is limited.

Regulatory approval has played a key role in Zipline's success. Recent clearances for 'beyond visual line of sight' operations enable the company to expand in the US. Over the coming months Zipline plans to roll out its P2 system to serve 30+ million people in 10 US states. This expansion will make fast, zero-emission deliveries accessible to more households and businesses, reshaping how goods are transported.

Zipline's impact extends beyond convenience. Its drones have contributed to lowering maternal mortality rates by improving access to medical supplies. They have expedited vaccine distribution, particularly in remote areas where traditional transport is unreliable. Zipline's technology offers a glimpse into the future - a world where delivery delays are minimized, emissions are reduced and access to essential goods is democratized.

Zipline has saved more than 750,000 gallons of fuel compared to equivalent road deliveries

Footnotes
43   Jet Propulsion Laboratory, Mars Helicopter Ingenuity

Zipline is completing a commercial delivery every 70 seconds. Its drones have flown the longest fully autonomous flights in the US – 66 kilometres - and the world – 209 kilometres - without visual observers

The Ingenuity Mars Helicopter was a small aircraft carried to the surface of the Red Planet attached to the belly of the Perseverance rover. Ingenuity's mission was experimental in nature and completely independent of the rover's science mission.

Ingenuity was deployed to the surface 4 April, 2021. On 19 April, it became the first aircraft in history to make a powered, controlled flight on another planet. Flight on Mars is challenging because the Red Planet has a significantly lower gravity – one-third that of Earth's – and an extremely thin atmosphere with only 1% the pressure at the surface compared to our planet. This means there are relatively few air molecules with which Ingenuity's two 1.2-metre-wide rotor blades can interact to achieve flight.

The rotorcraft's flights are autonomous – piloted by onboard guidance, navigation and control systems running algorithms developed by the team at the Jet Propulsion Lab. Because data must be sent to and returned from the Red Planet over millions of miles using orbiting satellites and NASA's Deep Space Network, Ingenuity cannot be flown with a joystick and its flights are not observable from Earth in real time. To operate on Mars, the rotorcraft requires the Perseverance rover to assist in communications back and forth from Earth.

After its fifth test flight 7 May, 2021 the Ingenuity experiment embarked on a new operations demonstration phase, exploring how aerial scouting and other functions could benefit future exploration of Mars and other worlds. The data from these flights is also being used to help inform decisions relating to considering small helicopters for the role as full standalone science craft carrying instrument payloads. In the distant future, Mars helicopters might even help astronauts explore the Red Planet.[43] In fact, NASA's ambitions are already taking shape with plans for a drone mission to Titan, Saturn's largest moon, set for launch in 2027. Titan's dense atmosphere and lower gravity make it a prime candidate for powered flight, potentially unlocking new ways of exploring extraterrestrial environments

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Talking Point 8

DRONE R A C I N G

While NASA pushes forward on Mars and Titan, the European Space Agency (ESA) is looking at Earthbound drone racing to refine space-bound AI systems

Testing takes place at Delft University of Technology's Cyber Zoo, a controlled environment where drones equipped with ESA's neural networks fly through obstacle courses.[44] The confined 10-by-10-metre space presents a series of challenges - tight turns, sudden obstacles and fluctuating environmental factors - that mimic the unpredictability of space travel. The AI system recalculates trajectories in real time, learning to adapt to physical limitations such as lower-than-expected thrust or changing flight conditions. These trials provide a crucial comparison between AI-controlled drones and those flown by human pilots, ensuring that autonomous systems meet - and eventually exceed - human capabilities.

While NASA pushes forward on Mars and Titan, the European Space Agency (ESA) is looking at Earthbound drone racing to refine space-bound AI systems. The high-speed, high-stakes environment of drone racing provides an ideal test bed for AI-powered guidance and control systems. These AI systems aim to help spacecraft navigate autonomously, adjusting to the unpredictable conditions of space - fluctuating gravity, sudden turbulence and shifting trajectories without constant intervention from mission control on Earth.

To achieve this, ESA is developing what it calls Guidance & Control Networks (G&C Nets). Unlike traditional navigation methods, where routes are pre-planned and uploaded to the spacecraft, G&C Nets allow for dynamic recalculations. As conditions change, the AI continuously determines the most efficient trajectory, optimizing paths on the fly rather than rigidly adhering to pre-set routes. This adaptive capability not only boosts mission efficiency but also makes spacecraft more resilient to unexpected challenges.

The lessons from these experiments will influence ESA's October-launched Hera mission, which aims to study the Didymos binary asteroid system. This mission follows NASA's 2022 DART initiative, where a spacecraft intentionally collided with the Didymos asteroid to test planetary defense strategies. Hera will autonomously navigate the asteroid field, analyzing the aftermath of the DART collision and gathering data that could be essential for future asteroid deflection efforts. The ability to adapt and replan trajectories in real time will be critical for avoiding hazards and ensuring mission success.
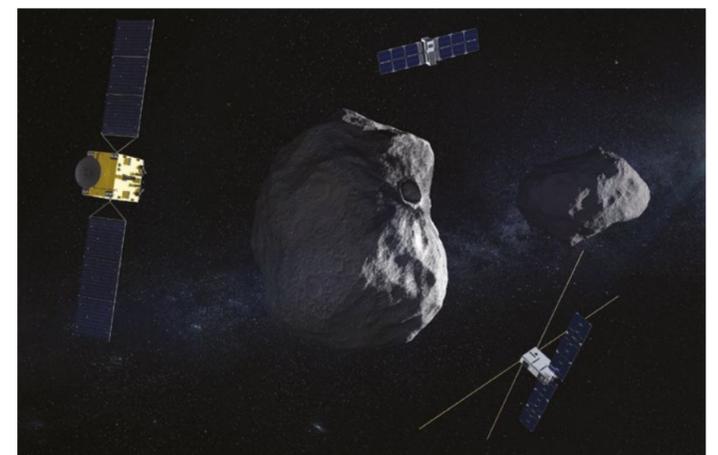
Talking Point 9

SAFEGUARDING
E A R T H

Asteroids are bodies originated in the young stars nebulae that never grew to planets, formed of rock and metal. Among them, those that have an orbit that brings them close to Earth within 45 million kilometres, known as near-Earth asteroids, represent a risk. There are plenty of such bodies in our Solar system, from small ones measuring a few metres - there are 40-50 million of them - up to larger ones, measuring more than 1 kilonmetre but much scarcer – there is less than 1,000 of them.

40-50MN ——— **NEAR-EARTH ASTEROIDS**

Neither the smaller near-Earth asteroids nor the larger ones represent a real threat to humanity. Small asteroids actually hit the Earth quite frequently - every two weeks - with no consequences. The larger ones, although potentially dangerous, are well known and tracked and it takes millions of years to have one of them hit Earth. Actually, a 10-kilometre asteroid impact is the most accepted theory of the Cretaceous extinction around 66 million years ago, ending with three-quarters of the plant and animal species, among others the dinosaurs.

The mid-sized class asteroids of more than 100 metres are the ones we worry about. There are about 30,000 near-Earth asteroids of the 100-to-300-metre size class, 82% of them are still to be spotted, hitting the Earth every 10,000 years. The impact energy of such an asteroid is equivalent to around 50 megatons of TNT, the power of a "Tsar Bomba".[45] The effect of such an impact would be devastating if it reached a populated area, capable of destroying an entire city or creating a tsunami if it impacted water.

The Didymos binary asteroid system is prototypical in terms of size of the thousands of asteroids that pose a hazardous risk of impact to our planet. Around the Dydimos main body, 780-metre in diametre, orbits the 150-metre Dimorphos moonlet, which is the first body in the Solar System to have had its orbit measurably changed through human action, by the DART impact and it is also the smallest asteroid yet visited by man. The Hera spacecraft will reach the binary asteroid in October 2026, after a two-year cruise phase. The day Hera reaches Didymos, it will be 195 million kilometres away from Earth.[46]

100M — **300M**

THE MID-SIZED CLASS ASTEROIDS ARE THE ONES WE WORRY ABOUT

30,000

NEAR-EARTH HITTING ASTERIOIDS WITH AN ENERGY IMPACT OF 50 MEGATONS OF TNT HIT THE EARTH EVERY 10,000 YEARS

The day Hera reaches Didymos, it will be 195mn km away from Earth
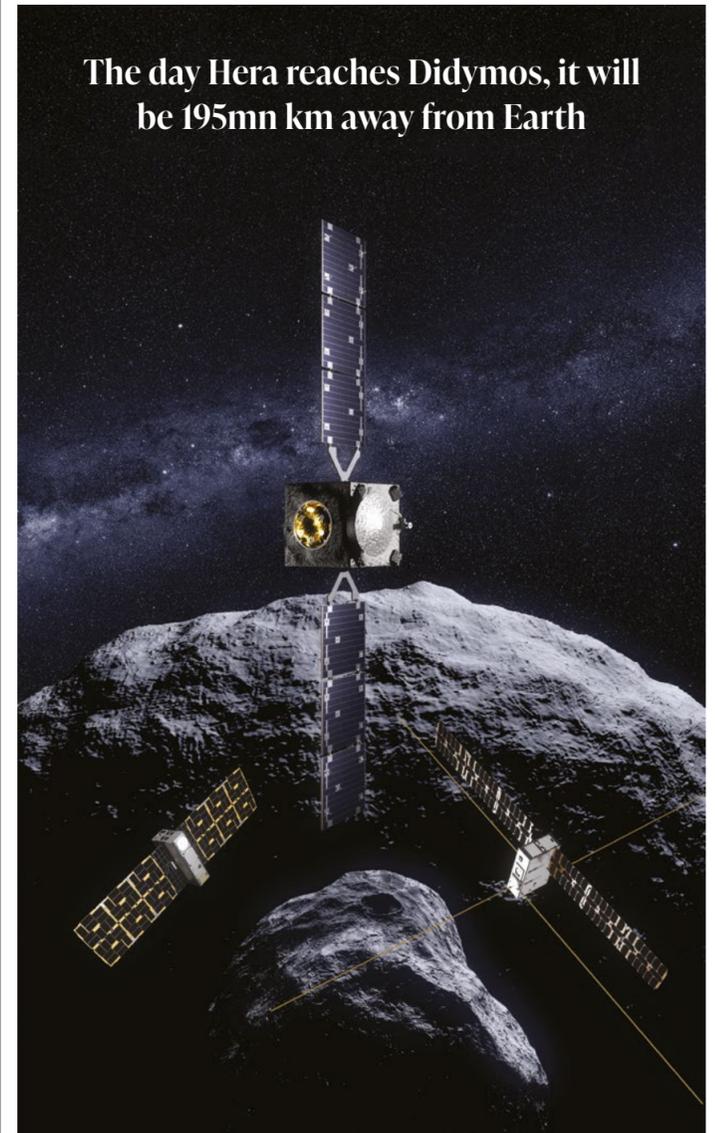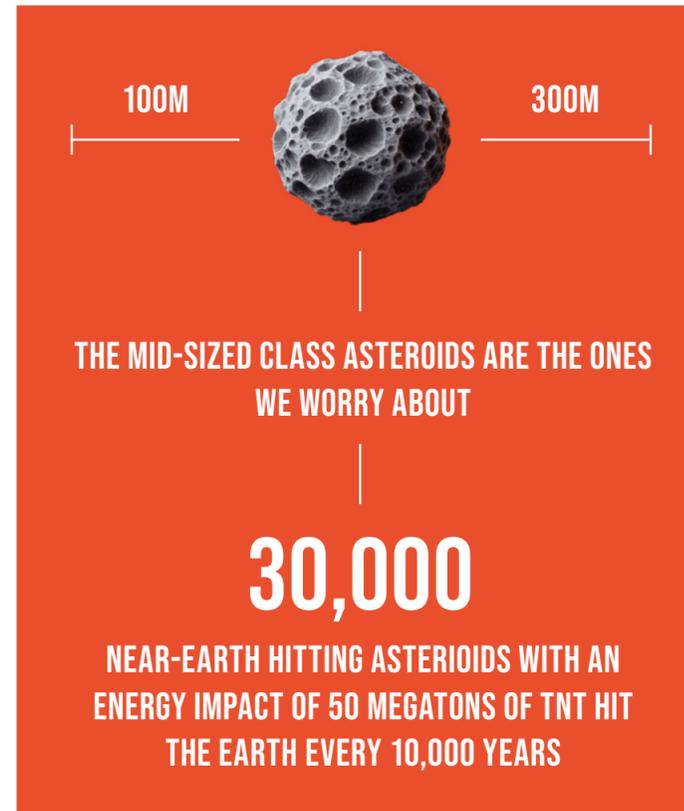
Talking Point 9 - Safeguarding Earth

The move toward autonomous navigation represents a fundamental change in how space missions operate. Traditionally, ground teams meticulously planned spacecraft routes, leaving the onboard systems to execute these plans. G&C Nets replace this rigid approach with a dynamic system where the spacecraft itself handles both guidance and control, recalculating optimal paths continuously. This not only reduces the need for constant ground intervention but also allows missions to respond more effectively to unexpected conditions.

The push for autonomous navigation is not just about efficiency – it is about enabling new possibilities for exploration. As spacecraft venture deeper into the solar system, real-time decision-making becomes increasingly important. Drone-based trials on Earth are laying the groundwork for this future, providing a reliable, tested framework for autonomous operations. The hope is that these systems will soon guide spacecraft on interplanetary journeys, land on distant worlds and navigate asteroid fields all with minimal human oversight. In the end, autonomy is more than a technological leap – it is a necessity for the next chapter of space exploration. Each recalculated flight, each adaptive maneuver, brings us closer to exploring the universe with the same agility and responsiveness that we rely on here at home.

G&C Nets replace this rigid approach with a dynamic system where the spacecraft itself handles both guidance and control, recalculating optimal paths continuously
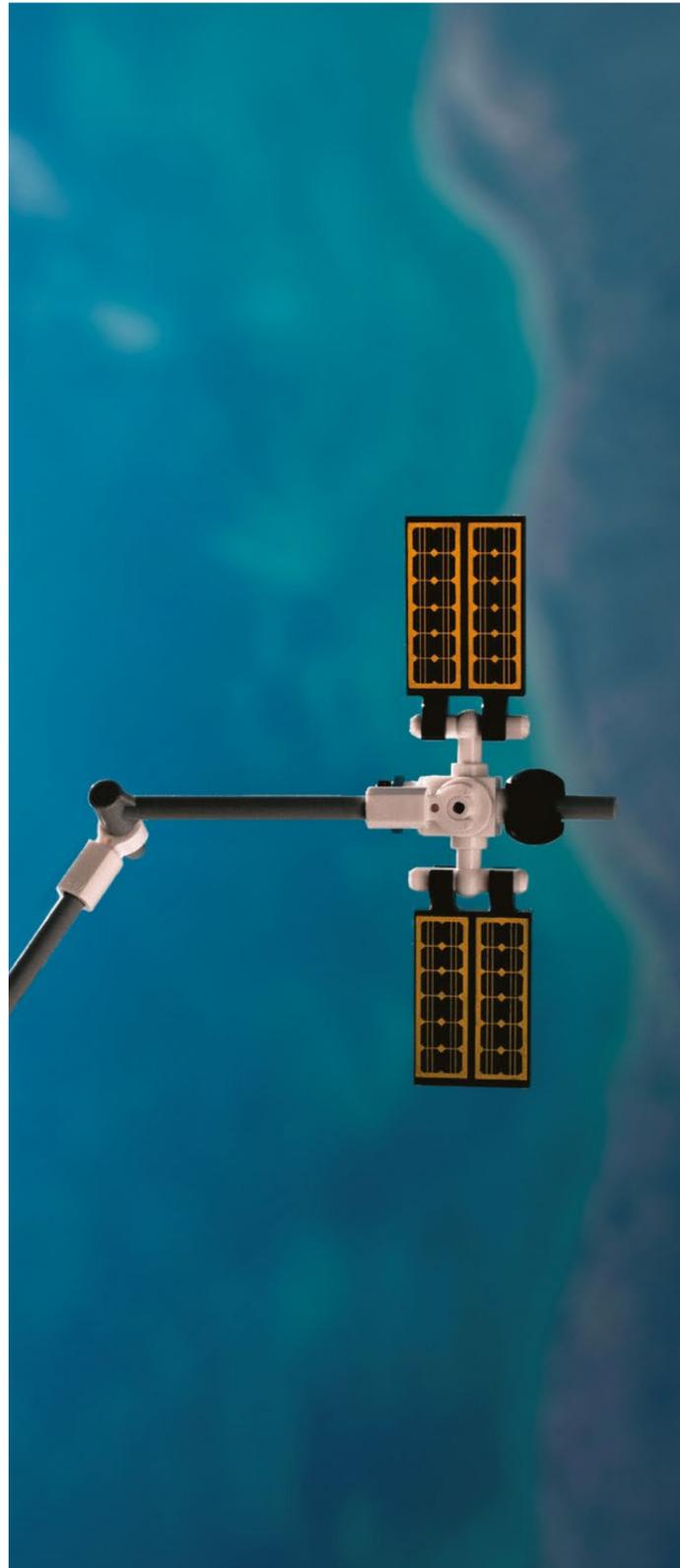
Future Flying

- **Automation & AI: The Smart Skies**
  Aviation has long embraced automation with autopilots and computer-guided systems steering planes safely. But AI is taking this further - playing a key role in aviation safety through predictive maintenance and self-monitoring systems, detecting potential issues before they become problems. In the years ahead, AI-driven analytics will streamline airline operations and bolster safety, ensuring smoother, safer flights.

- **Augmented Reality: Sharpening Pilot Vision**
  Augmented Reality (AR) is revolutionizing cockpit operations by giving pilots real-time data on terrain, weather and flight paths. Instant visual overlays help them make faster, clearer decisions. Beyond the cockpit, AR is improving training programs, helping pilots refine their skills and enhancing global safety standards.

- **Urban Air Mobility: The Skies Above Us**
  Urban Air Mobility (UAM) promises to reshape urban transport with electric flying vehicles offering swift, traffic-free commutes. Companies are racing to deploy these vertical take-off aircraft in cities by 2030, aiming to cut congestion and emissions. UAM could soon become a practical choice for short urban hops, blending advanced navigation systems with efficient, eco-friendly travel.

- **Automation in Aircraft Maintenance: Efficiency on the Ground**
  Aircraft maintenance is becoming smarter. Automation is streamlining maintenance, repair and overhaul procedures, slashing downtime and boosting safety. Automated systems handle planning and diagnostics, flagging potential issues before they escalate. The result, faster turnarounds and fewer disruptions.

- **Supersonic Flights: Mach 1.7**
  High-speed air travel is staging a comeback. United Airlines plans to introduce 15 new supersonic jets by 2029, marking a return to faster-than-sound commercial flights. Supersonic flight is when an aircraft travels faster than the speed of sound. At an altitude of 18,300 metres, that means flying faster than 1,060km/h. A typical passenger jet cruises at about 900km/h but Overture is expected to reach speeds of 1,805km/h - also known as Mach 1.7. At that speed, journey times on transatlantic routes such as London to New York can be cut in half.

- **IoT & Predictive Maintenance: Smarter Aircraft, Fewer Delays**
  The Internet of Things (IoT) is poised to redefine aircraft maintenance. Sensors embedded in plane components will collect data in real time, allowing teams to spot issues before failures occur. This technology will facilitate proactive maintenance schedules, ensuring technicians have the right parts and skills ready. The payoff: fewer delays, safer flights and more efficient operations.

Talking Point 10

A SKY SHARED

The sky is no longer the exclusive domain of jetliners, helicopters and seasoned pilots. UAVs - more commonly known as drones - have swiftly claimed their place, buzzing across our urban and rural landscapes in unprecedented numbers. Once considered niche gadgets for enthusiasts, drones now perform critical roles in industries ranging from agriculture to logistics and emergency response. But this transformation presents a looming challenge - how to ensure these nimble UAVs safely share airspace with traditional crewed aircraft?

UAV Explosion

Drones are proliferating at an astonishing rate. The global drone market, valued at US$30.5 billion in 2023 and grow to US$77.3 billion by 2028 at a CAGR of 20.5%.[47] In the US alone, the FAA estimates that of November 2024 there were 791,597 registered drones, with projections indicating that the figure will cross 1.4 million by 2025. Many more drones remain unregistered, particularly recreational models that weigh under 250 grams.[48]

The accessibility of UAVs is a key driver. Modern drones can cost as little as US$100, while sophisticated models capable of thermal imaging or advanced photography are available for under US$2,000. Technological advancements make drones easy to operate with minimal training. This accessibility means farmers in India can survey crops, logistics companies in Africa can deliver vaccines to hard-to-reach communities and content creators worldwide can capture aerial footage once reserved for film studios.

US$77.3BN
THE GLOBAL DRONE MARKET, VALUED IN 2028

20.5%   CAGR

Aviation's Established Giants

Despite the rise of UAVs, crewed aircraft remain indispensable. Helicopters, fixed-wing planes and other piloted aircraft handle critical tasks that drones have yet to fully replicate. In 2024, the global fleet of civil helicopters is estimated at 38,000 with the majority operating in sectors such as medical evacuation, law enforcement, search and rescue and firefighting. A single aerial firefighter, for example, can deliver up to 3,000 gallons of water per drop, far beyond a drone's capacity.

Yet, these aircraft frequently operate in low-altitude airspace - the same zone where drones hover. Urban airspace is particularly congested. Take London - the city's emergency services helicopters complete around 2,000 missions per year, often flying at altitudes between 152 and 457 metres. The potential for conflict with drones, especially when time-sensitive emergencies demand immediate airspace clearance, is a pressing concern.

In London, the city's emergency services helicopters complete around 2,000 missions per year

Footnotes
49   Drone Life, Drone Sightings Disrupt Swedish Airport: A Growing Need for Global Counter-Drone Technology
50   Sky Safe, Drones and Airplanes: A Growing Threat to Aviation Safety
51   SESAR, https://sesar.eu/sesar
52   JUTM, What is JUTM? (Organization overview) https://jutm.org/en/about/
53   FAA, The Recreational UAS Safety Test (TRUST)

Talking Point 10 - A Sky Shared

On Course for Collision

The threat of drone-related airspace incidents is no longer hypothetical. The December 2018 Gatwick Airport incident, dubbed "Drone Gate," caused 1,000 flight cancellations and stranded over 140,000 passengers due to unauthorized drone activity near the runway. The disruption cost airlines an estimated US$64 million. In a scene reminiscent of the Gatwick disruption, Sweden's largest airport, Stockholm Arlanda, temporarily halted flights due to the appearance of multiple drones. The incident occurred 9 September 2024, when four drones of "varying sizes" were spotted near the airport, leading authorities to suspend all air traffic for over two hours.[49]

Near misses between passenger aircraft and drones are not isolated events.

Since 2021, the Transportation Security Administration (TSA) reported over 2,000 drone sightings near US airports, including incidents at major airports nearly every day. From 2021 through 2022, TSA reported that 63 drone incidents caused pilots to take evasive action, including four that involved commercial aircraft. From January to March 2024, the FAA reported 200 drone sightings near US airports, with 6 requiring pilots to take evasive action.[50] The small size of many drones makes them difficult for pilots to see, especially during takeoff and landing when situational awareness is paramount. While the average drone weighs less than 1 kilogram, a collision with a jet engine or helicopter rotor can cause catastrophic damage.

"DRONE GATE"
THE DECEMBER 2018 GATWICK AIRPORT INCIDENT

140,000
PASSENGERS STRANDED

1,000
FLIGHT CANCELLATIONS

US$64MN
COST OF DISRUPTION TO AIRLINES

Navigating Solutions

Solutions are emerging to manage this aerial traffic jam. UAV manufacturers are incorporating safety measures such as geofencing, altitude caps - often limited to 121 metres by regulations -and automated "return-to-home" functions to prevent accidental intrusion into restricted zones. Leading drone models now include obstacle-avoidance systems that rely on sensors and AI to reduce collision risks. However, technology alone cannot resolve the issue. Regulatory bodies are playing catch-up. The FAA's Remote ID rule, implemented in 2023, mandates that drones broadcast identifying information to help authorities track UAVs in real time. Similar measures are being adopted in Europe under the European Union Aviation Safety Agency.

Unmanned Traffic Management (UTM) systems are the next frontier. These systems, akin to traditional air traffic control, will coordinate drone operations with crewed aircraft. The Single European Sky ATM Research 3 Joint Undertaking, an EU public-private partnership, is already trialing UTM solutions that integrate drones into urban environments.[51] In Japan, the government has rolled out a national UTM platform to manage UAV flights for logistics, inspection and emergency response.[52]

Education & Compliance

Regulations can only be effective if UAV operators are aware of them. In the US, the FAA's TRUST - The Recreational UAS Safety Test - provides basic safety education for hobbyists.[53] In the UK, anyone operating a drone over 250 grams must pass an online competency test and register their device. But gaps remain - unregistered drones, inexperienced pilots and rogue operators continue to pose risks.

Towards Harmonious Skies

The integration of drones into shared airspace is an intricate challenge but not an insurmountable one. The future of aviation depends on smart regulations, advanced tracking technologies and a commitment to operator education. As the sky grows busier, collaboration between manufacturers, regulators and aviators will determine whether drones enhance or endanger our aerial ecosystem. The goal is clear - a harmonious sky where UAVs and crewed aircraft coexist safely, efficiently and productively.

IN THE US, THE FAA'S TRUST - THE RECREATIONAL UAS SAFETY TEST - PROVIDES BASIC SAFETY EDUCATION FOR HOBBYISTS

Q&A

HE AZZAN AL BUSAIDI
Undersecretary, Tourism
Ministry of Heritage & Tourism

TEJARAH TALKING

Artificial Intelligence (AI) might be the latest tech headline but in the world of tourism, it is already hard at work. From booking assistants that simplify travel plans to personalized recommendations and energy-efficient hotels, AI enhances how we explore and experience destinations. For Oman's tourism sector, AI offers an edge - streamlining services, empowering young professionals and supporting sustainable growth. We sit down with HE Azzan Al Busaidi, Undersecretary, Tourism at the Ministry of Heritage & Tourism to discuss AI's role in shaping the future of travel.

**AI is a hot topic right now.
How is it affecting the travel and tourism industry in practical terms?**

AI might seem like a recent buzzword, thanks to tools like ChatGPT and DALL-E but it has been working behind the scenes for years. In travel and tourism, we are not talking about future possibilities – we are talking about what is already happening. Take chatbots, for example. Many of us use them without giving it a second thought. These virtual assistants guide travelers through booking flights, hotels and tours. And it is not just a side feature - In 2024, it is estimated AI will have influenced 32% of all travel industry revenue.

*In 2024, it is estimated AI
will have influenced 32% of all
travel industry revenue*

Beyond chatbots, how else is AI making its mark on tourism?

Personalization is where AI really shines. Think about when you book an Oman trip online - those tailored flight or hotel recommendations are powered by AI. It is the same kind of technology that helps Amazon suggest products you might like. But AI is not staying behind a screen. Some hotels are introducing robot concierges to make check-in quicker and more efficient. Hilton has Connie, powered by IBM's Watson. Other brands like Aloft and Yotel have their own versions too. These robots are not just for show. In fact, it is estimated hotels that use AI can boost profits by 10% and cut costs by 15%. And as a result, studies suggest nearly 78% of hotel managers are investing in AI to streamline operations. For Oman's hotels, embracing this technology means better service, smoother operations and a competitive edge.
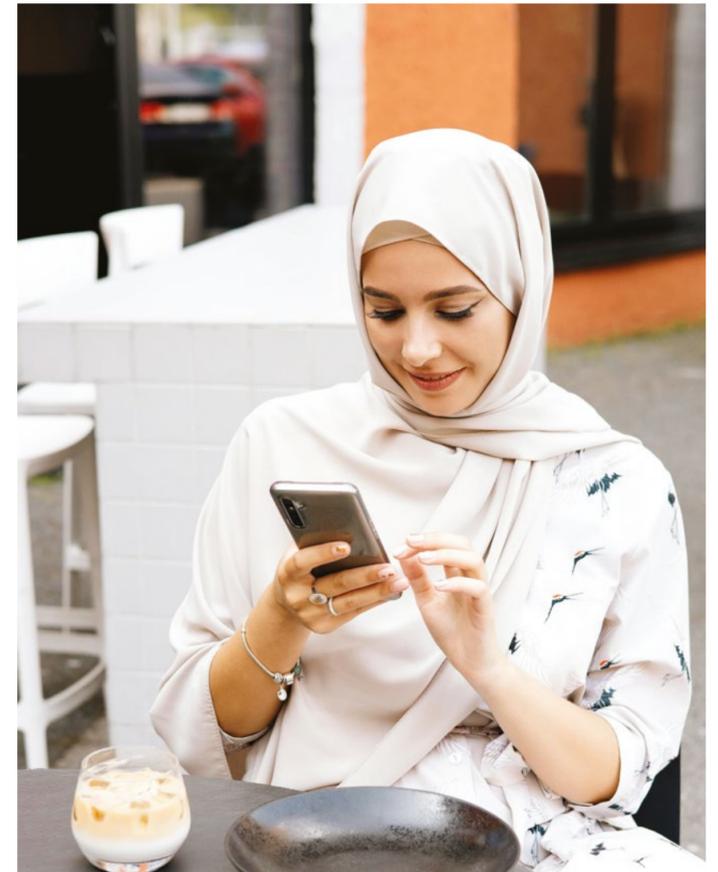
Hilton

Q&A

What about jobs? People worry that AI might replace them. How do you see this playing out for Oman's tourism sector?

It is a valid concern. Goldman Sachs estimates that two-thirds of jobs in Europe and the US could see some automation and generative AI might take over a quarter of current tasks. But history shows that while some jobs disappear, new ones take their place. The World Economic Forum predicts that AI will eliminate 85 million jobs by 2025 - but here is the good news – it is expected to create 97 million new jobs in fields like big data, machine learning and digital marketing. In Oman, we are preparing for this shift. At the Ministry of Heritage & Tourism, we are focused on equipping young Omani professionals with the skills they need for these new roles. Whether it is helping reskill the workforce or supporting entrepreneurs, we want Oman's ambitious talent ready to seize these opportunities.

85MN
AI WILL ELIMINATE
JOBS BY 2025

WORLD ECONOMIC FORUM

97MN
NEW JOBS AI
WILL CREATE

Can you give some specific examples of how AI can help people working in tourism?

Absolutely. ChatGPT, for example, is a great tool for learning coding. Why is that important? Because coding helps build the websites, mobile apps and virtual reality experiences that will drive Oman's tourism sector forward. AI also supports customer-facing roles. It can help improve communication skills, connect with new markets as well as create more personalized services. For small businesses and entrepreneurs, AI can assist in drafting business plans, building marketing strategies and even preparing presentations. In short, it is a tool that can empower people to do their jobs better, grow their businesses and reach new heights.

Mobile apps and virtual reality experiences will drive Oman's tourism sector forward
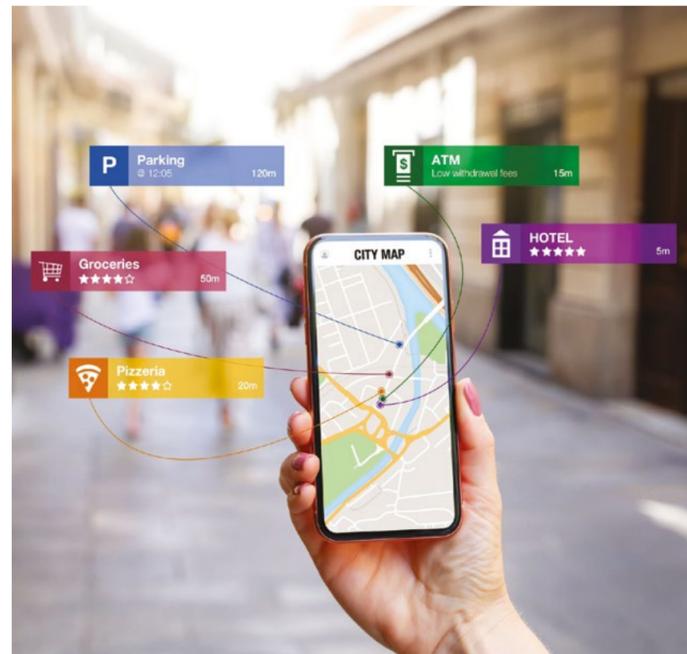
How can smaller tourism companies in Oman benefit from AI?

The beauty of AI is that you do not need to be a large company to use it effectively. Start-ups and SMEs can adapt quickly and combine AI-driven tools with genuine human interaction. This allows them to offer more personalized and niche experiences that larger companies might overlook. In a competitive industry, that kind of agility is a real advantage. Whether it is tailoring experiences for adventure tourists or offering unique cultural insights, smaller tourism businesses in Oman can use AI to deliver something special.

Sustainability is a big focus for Oman. Can AI support sustainable tourism?

Definitely. Sustainability is high on the ministry's agenda. AI can help in practical ways. For example, hotels can use AI to monitor and manage energy consumption, making sure resources are not wasted. Restaurants can use predictive analysis to better forecast demand, reducing food waste and cutting costs at the same time. For travelers, AI-powered apps can calculate the carbon footprint of a trip and suggest ways to offset it. These tools help us move towards Oman's 2050 Net-Zero target, promoting more responsible tourism practices.

Do you think AI-powered virtual or augmented reality could replace real travel?

VR and AR are certainly exciting tools and there are definitely business opportunities there. But they cannot replace the real thing. You cannot replicate the feeling of standing in the desert, the scent of frankincense, or the warmth of Omani hospitality through a headset. AI's real strength is as an enabler. Under the wise leadership of His Majesty Sultan Haitham bin Tarik, Oman Vision 2040 has ambitious targets - US$22.5 billion annually from tourism, contributing 6% to GDP and a total of 80,000 hotel keys by 2040. AI will help us get there, enhancing Oman's unique offerings and driving growth.

## So, AI is not replacing travel – it is enhancing it?

Absolutely. Oman's stunning landscapes, rich heritage and culture and talented youth are what make our tourism sector strong. AI will help us amplify that, opening up new opportunities, improving services and ensuring Oman remains a top destination for generations to come.

OMAN CAN USE AI TO DELIVER SOMETHING SPECIAL

HOTELS
MANAGE ENERGY CONSUMPTION

RESTAURANTS
PREDICTIVE ANALYSIS TO BETTER FORECAST DEMAND
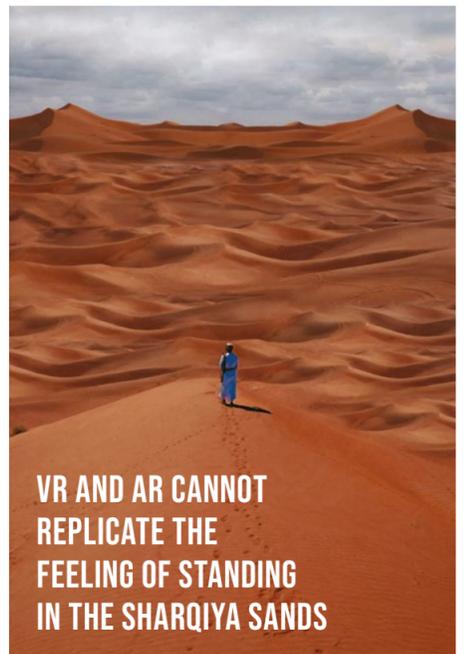
VR AND AR CANNOT REPLICATE THE FEELING OF STANDING IN THE SHARQIYA SANDS

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THANK YOU
TO OUR PANELISTS & ALL
THOSE WHO ATTENDED

1. Eng. Mubarak Al Farsi
2. Dr. Haidar Al Lawati
3. Said Abdul Ghafoor Saifudeen
4. James Dorris
5. Q&A

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