# Technology toolkit




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# Introduction

With a long and successful history of inventions, it is no surprise that the UK is regarded as one of the most innovative countries in the world.

Innovation is at the heart of its heritage, present and future. From George Stephenson's Rocket[1] (1839) and Percy Shaw's Cat's Eye to stereo sound; the discovery of the radar detection system; the first programable machines (e  arly computers), the ATM (Automated Teller Machine) and Professor Sir Tim Berners-Lee's work to create the World Wide Web the UK has demonstrated time and again that ambition has no limits.

UK tech is growing at a faster rate than the UK economy and is maintaining its lead as one of the world's premier locations for tech of all kinds. The **combined value of UK tech companies** founded since 2000 is now **£540 billion** and more money than ever is flowing into UK tech – £29.4 billion in 2021 raised by UK start-ups and scale-ups, up from £11.5 billion[2] in 2020.

In a dynamic environment where tech will transform everything we do, UK innovations continue to shape the world. From being one of the world's first regions to roll out **5G innovation** to testing **connected and autonomous vehicles (CAVs)** on public roads, and being an early adopter of **Artificial Intelligence (AI)**, the UK is at the forefront of several technology sectors.

Recognised as a **pioneer in the digital revolution**, the UK's technology economy also has strengths in electronic systems, data management and analytics, data centres, cloud services, artificial intelligence, cyber, semiconductor design and sensors – with clusters of tech excellence right across the country[3].

The UK is a hub for **fintech innovation**, hosting many of the world's first digital-only banks, including Monzo, Starling Bank and Atom Bank[4], and employing over 76,500 people across the country – a figure set to grow to 105,500 by 2030.

**Creative industries** also play a pivotal role among the tech sectors, considered a driving force in the post-pandemic economic recovery of the UK. Here too, the UK is a global leader with investment opportunities in TV, music, publishing, design, film, games development and advertising.

Excellent business opportunities lie in the growing **cyber security** markets – a sector that employs almost 50,000 people. The UK Government has put in place more than 130 programmes in cyber security to ensure a pipeline of specialists to meet demand.

The UK is also home to four of the world's top ten universities: Oxford, Cambridge, University College London and Imperial College London.

Promoting critical thinking, required to improve business performance, as well as supporting new R&D facilities that focus on turning ideas into commercial enterprises.

With a £6 billion investment per year in **research councils and universities**, while also supporting a network of **Catapult Centres** to help emerging technologies become commercially viable, the UK is committed to world-leading research and development (R&D) to continue supporting businesses to reach their full potential.

Therefore, the UK offers a robust, business-friendly environment in which to reliably expand, trade and invest, in addition to generous tax breaks make the UK more attractive to international investors than ever. In 2020, 63% of tech investment came from overseas, up from 50% in 2016. Small and medium-sized businesses can benefit from venture capital schemes that offer tax relief for investors and help make the UK the best place to start, finance and expand a business in Europe. The R&D expenditure tax credit offers generous incentives of up to 230% for companies investing in UK R&D projects.

Robust skills and talent base, a commitment to R&D, a nationwide technology supply chain and a business-friendly environment make the UK a solid market for companies and investors looking to expand in tech.

[1]15 best British tech inventions ever, Techradar.com

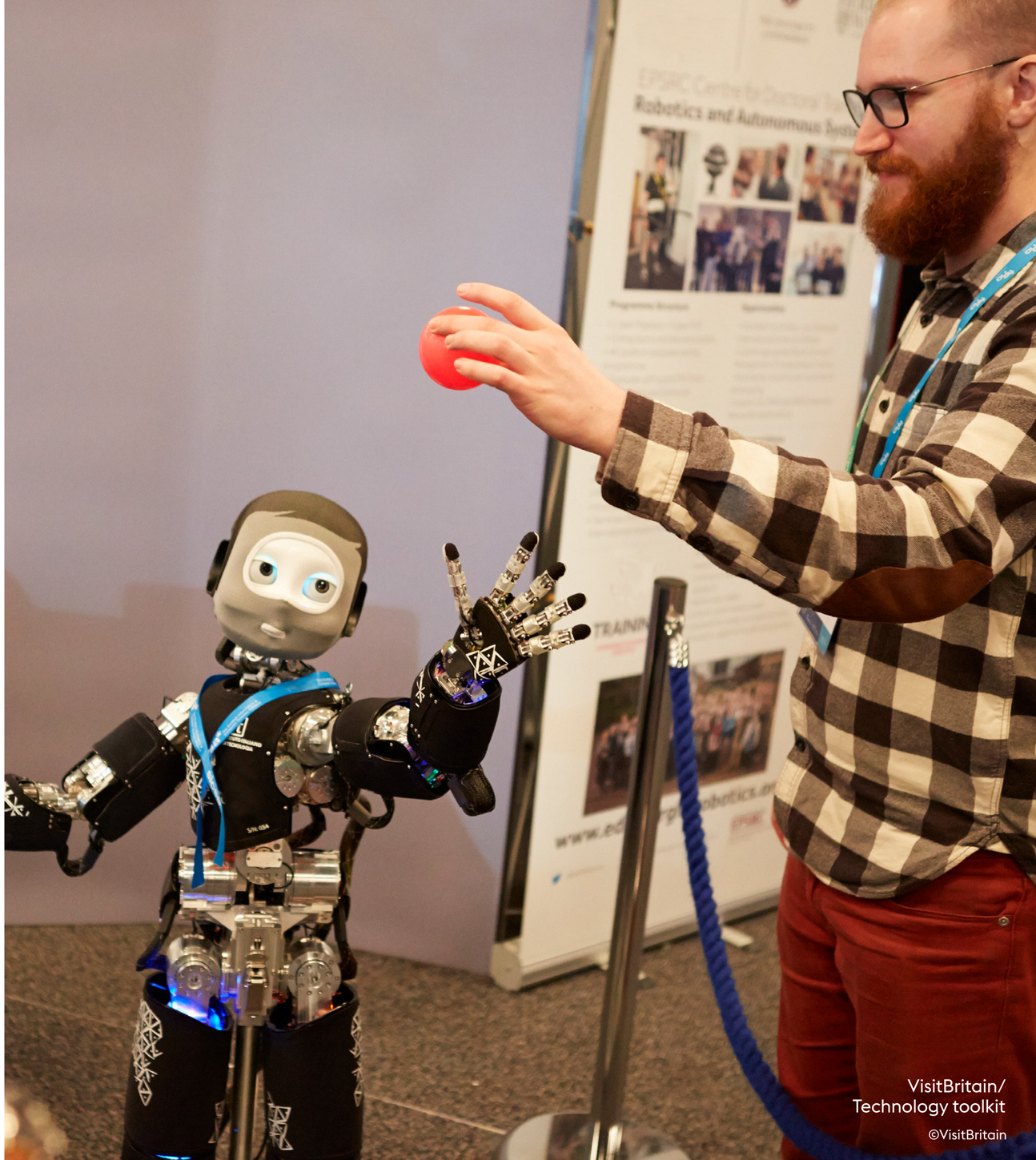
[2]Technology, great.gov.uk

[3]UK innovation, great.gov.uk

[4]How UK Innovations Shape the World, great.gov.uk

# Sector in Stats

- UK tech saw **£29.4 billion** flow into the sector in 2021, up from **£11.5 billion**
- The UK tech industry has expanded tenfold in the past **10 years**
- Wales has **3,600** tech businesses employing **45,000** people
- Between 2010 and 2020 the number of British unicorns — private tech firms valued at more than **$1 billion** — grew from eight to 81
- London is **fourth** behind the Bay Area, Beijing and New York in terms of the number of start-ups and unicorns created
- Edinburgh is already the UK's top city for start-ups, with **92%** growth potential
- Venture capital investment into the UK rose from **£1.2 billion** in 2010 to **£11.3 billion** in 2021
- In 2020, Statista reported that total UK revenue from the production of video games was **£2.6 billion**
- The UK invests **£6 billion** each year in research councils and universities
- Manchester has been the recipient of over **£33.5 billion** of investment made by both public and private sector in recent years
- The UK ranks fifth on the Global Innovation Index 2019 and is the **highest-ranking** G7/G20 economy
- The UK's digital infrastructure network supports a software and technology sector larger than the rest of Europe **combined**
- Belfast is one of the best cities in the UK to work in tech, with **23%** of Northern Ireland jobs advertised last year in digital tech roles
- Northern Ireland is the **number-one** international investment location for US cyber security firms
- Investment in the creative industries aims to generate an extra **£28 billion** for the economy by 2025 and create 300,000 more jobsfirms



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# Sub-sectors

## Artificial Intelligence

AI has been around since Alan Turing, the noted UK computer scientist who laid the foundations for machine learning through his work decoding World War Two's Enigma messages.

Nowadays, AI is a growing business with great social and economic impact. According to a study by PwC, it is predicted that by 2030 AI's contribution to the global economy would exceed $15.7 trillion USD – and for the UK alone it's worth an estimated **£630 billion**. With 1,300 companies and a collective turnover of almost £1.47 billion[5], the UK is home to 50% of the AI companies in Europe.

At the vanguard of tech transformation, start-ups and renowned organisations have been working hard to continue improving AI. Founded in the UK, **Google DeepMind** sent ripples across the world when its AlphaGo programme became the first-ever AI to beat a human at the board game, Go.

Similarly, there is **Emotech**, a UK start-up which has developed the world's first robot with a personality. Aiming to bring emotion into engagement the robot, Olly, has raised the bar in the development of robotics and AI, with the ability to understand whether users are happy, or sad, and to respond appropriately.

The transferability of developments in AI is also enhanced by the UK Tech Cluster Group. They enable collaboration and provide a forum that engages thousands of technology businesses, encouraging innovation in AI.

## Augmented Reality/Virtual Reality

The UK augmented reality (AR) and virtual reality (VR) sector is the **fastest growing in Europe.** AR and VR technologies are being used across industries – including smart cities, engineering, film and TV, gaming and health tech.

The UK's AR and VR strengths span all aspects of the industry, from creation, development and production of immersive content to software and hardware creation. The industry can access talent from internationally recognised universities, including Durham University. With well-established academic computer science courses and research, Durham has the UK's first **Intel oneAPI Academic Centre of Excellence**.

A variety of hubs across the country including Scotland, the North East, and the North West offer exciting investment opportunities. With **1,250 immersive technology companies** operating across various sectors, the UK's immersive industry provides a significant pool of talent with a broad range of transferable skills. With an expected growth of **£62.5 billion by 2030**, the UK offers significant opportunities for investment[6].

## Digital media and entertainment

With its significant strengths in research and development, the UK is a global driving force for innovation in the creative industries, with investment opportunities in TV, music, publishing, design, film, games development and advertising. Manchester, Coventry and Warwickshire, Guildford and London all have significant creative clusters.

Creative industries are considered a driving force in the post-pandemic economic recovery of the UK, with increased investment in the sector set to generate an **additional £28 billion** for the economy **by 2025** and create 300,000 more jobs.

The UK is the **leading video game market in Europe** and the sixth-largest globally. With the global video games industry forecast to be **worth £200 billion by 2025**, the sector presents highly lucrative opportunities for investors[7].

As an added incentive, creative industry companies involved in television, film, and theatre productions may qualify for Corporation Tax Relief from HMRC. Corporation Tax Video Games Tax Relief is available for the production of games certified as 'British made' by the British Film Institute (BFI).

## E-commerce

The UK is a world leader in **e-commerce and retail technology**. Over **£92 billion** – the highest in Europe – was made through online sales in 2021. The Government actively supports these efforts through its Digital Commerce Team and the Department for Trade & Industry (DIT), helping UK-based companies expand into emerging markets.

DIT has a dedicated team of experts in digital trade to provide investors with market entry advice and encourage connections throughout the digital ecosystem. Among the UK's many retail assets, the countrywide retail technology testbeds stand out. Based in Gloucester, the **UK Digital Retail Innovation Centre** is a national centre for testing and developing disruptive innovations, including holographic 'virtual employees', AI, 3D scanning and drone deliveries.

The UK has the **largest mobile retail sector in Europe**, with 43% of retail conducted through smartphones and tablets. Mobile retail is now the fastest-growing segment of the retail sector in the UK. E-commerce and retail technology can also draw on the skills and capabilities provided by the AI and fintech sectors[8].

[5]Sechnology, great.gov.uk

[6]AR & VR, great.gov.uk

[7]Creative industries, great.gov.uk

[8]Retail, great.gov.uk

[9]Cyber security, great.gov.uk

# Sub-sectors

## Cyber security

The UK has an impressive reputation for providing trusted cyber security solutions to organisations across the world, with **British exports predicted to rise to £3.2 billion by 2023**. A thriving tech ecosystem, couple with a growing supply chain and a raft of entrepreneurial universities, offers a firm foundation for Cyber companies looking to invest and thrive[9].

With a diverse range of applications, from financial services, retail and healthcare to connected devices, infrastructure and transport, the UK cyber security sector was worth £8.9 billion in 2020. A multitude of companies also provides expertise in areas ranging from strategic consulting and professional cyber services (PwC, Deloitte) to network security (BT, Telesoft Technologies).

Expanding the talent pool is also a key part of the UK's goals. Across the **Cyber Skills Immediate Impact Fund**, the government seeks to increase the diversity and numbers of those working in the UK's booming cyber security sector. An example of this work is the **UK's Cyber Neurodiversity Network** which supports neurodiverse individuals to work in the sector, in line with the UK's aim to develop all aspects of the industry.

With more than 1200 early-stage cyber security companies and multiple internationally renowned cyber security clusters, such as Manchester and South Wales, the UK provides world-class business opportunities. Investments in this sector are even more attractive as the government provides support and incentives to strengthen growth and innovation in the sector.

Whether your business is an SME or a large corporation, there is a place to thrive within the UK market, and a diverse range of services to take advantage of.

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# Research and development

When it comes to R&D, the UK offers some of the finest talent in the world, benefiting from a range of top-tier universities, including Oxford, St Andrews and Durham, all of whom directly support research and development.

Through the Audience of the Future challenge, the UK Research and Innovation has invested **£39.3m** in the development of **new, immersive technologies**, such as virtual, augmented and mixed reality[10].

To support companies to keep funding and promoting research and development, the UK provides tax relief through R&D tax credits. Moreover, direct investment from the British government reinforces efforts in this field and, across the UK Research and Development Roadmap, it sets out a goal of public investment in R&D reaching £22 billion per year in 2024/2025.

**Vision 2035** commits the UK to support businesses in innovative sectors, such as AR and VR, and this is reflected in support provided by funding initiatives. The R&D tax scheme and Patent Box work alongside each other to incentivise and support business innovation. The Patent Box scheme provides a lower effective corporate tax rate of 10% on profits attributable to UK, or certain European patents.

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# Green Technology

The UK has ambitious climate commitments, including reaching Net Zero emissions by 2050. Information and Communications Technology is increasingly held up as a key component of any solution to the global climate crisis and associated targets and goals, with **Green Technology** at the heart of the UK Government's low-carbon transition.

In May 2020, the government launched a **£40 million Clean Growth Fund** with the aim of accelerating early-stage green businesses across the power, transport, waste and building sectors[11].

In November 2020, it also launched its **Ten Point Plan** for a **UK Green Industrial Revolution**, building on the UK's strengths in offshore wind, carbon capture usage and storage (CCUS), hydrogen, nuclear, green maritime and green finance. By mobilising £12bn of government investment, the plan aims to spur three times as much from private sector investment by 2030 to build green jobs and industries of the future in the UK and around the world.

Also aligned with its green initiatives, the UK Government announced in May 2021 a **£166.5 million cash boost** aimed at driving forward developments in critical technology needed for carbon capture, greenhouse gas removal and hydrogen. This investment will help put the UK at the forefront of green innovation.

Closer collaboration between energy sectors and the UK's academic and research communities is also bringing new technologies to the market – all supported by world-class education, research and technology transfer centres.

Through the **Direct Air Capture and Greenhouse Gas Removal programme**[12], businesses developing technologies new to the UK can bid for a share of £64 million in government funding for projects that will capture carbon emissions and remove greenhouse gases from the atmosphere. This government funding will support companies across the UK to implement cutting-edge technology, stimulating further investment from the private sector, and helping develop UK expertise in this area.

By investing and trading with UK industries, it is possible to make a difference.

[10]ukri.org

[11]Government launches new 40 million clean growth fund to supercharge green start-ups, gov.uk (May 2020)

[12]Direct air capture and other greenhouse gas removal technologies competition, gov.uk (May 2022)

# Any questions?

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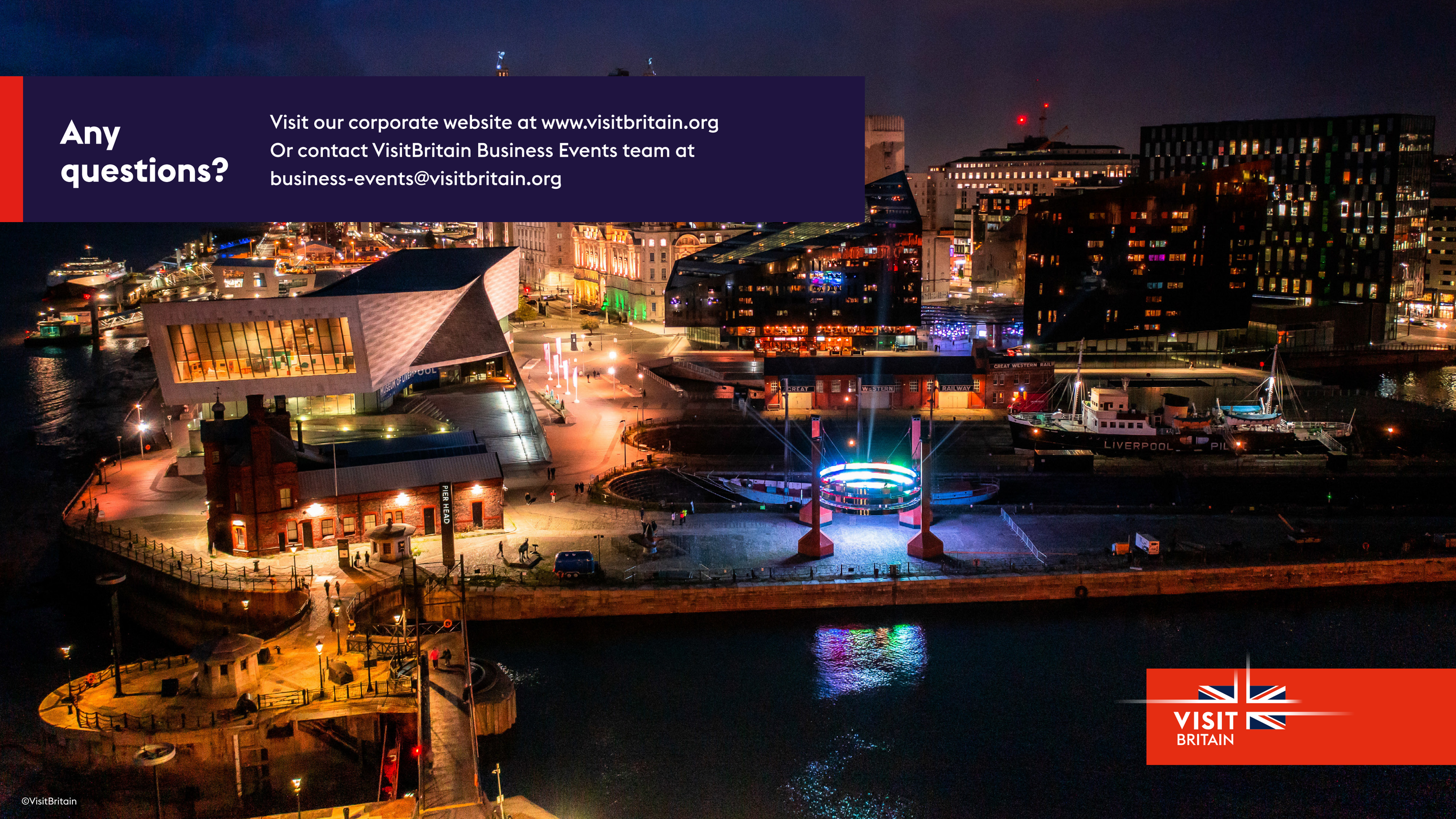


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