Confronting cyber threats to businesses and personal data

- Leading technology firm Arm is working with government to strengthen cyber security measures for businesses and the public
- £36m investment will help make the UK a world leader in tackling many forms of cyber threats to online products and services
- Around a third of businesses report having cyber security breaches or attacks in the last 12 months – with cyber threats constantly evolving

British businesses and the public are set to be better protected from hostile cyber-attacks and online threats like disinformation and cyber-bullying through a new government-backed partnership with industry, Business Secretary Andrea Leadsom announced today (Friday 18 October).

Government is partnering with Arm in a new project to develop new chip technologies that are more resistant to cyber threats, backed by £36 million in funding. This is the next phase of the Government's Digital Security by Design initiative, also backed by Google and Microsoft.

The average cost of a cyber-attack on a business – where a breach has resulted in loss of data or assets – has increased by more than £1,000 since 2018 to £4,180. While doing the basics, such as having strong passwords and updating software regularly are the best defence for homes and businesses, having innovative hardware and systems solutions are critical to defend advanced technology and our defence systems.

This project has the potential to prevent hackers from remotely taking control of computer systems as well as targeting cyber-attacks and breaches, meaning more businesses providing online services are better protected. It will also create new business opportunities and help boost productivity.

Business Secretary Andrea Leadsom said:

> Cyber-attacks can have a particularly nasty impact on businesses, from costing them thousands of pounds in essential revenue to reputational harm.
>
> Cyber-criminals operate in the shadows, with the severity, scale and complexity of breaches constantly evolving. It's critical that we are ahead of the game and developing new technologies and methods to confront future threats, supporting our businesses and giving them peace of mind to deliver their products and services safely.
>
> Investing in our world-leading researchers and businesses to develop better defence systems makes good business and security sense.

Minister for Digital and Broadband Matt Warman said:

> The government wants the UK to be the safest place to be online and the best place to start and grow a digital business. As these investments show, we are determined to create the right environment to foster our thriving digital economy while giving people renewed confidence and trust in online services.
>
> We will always be firm in our support for the UK's tech sector. Thanks to our work with the UK's world-leading academic institutions and our business-friendly environment, we are helping entrepreneurs use technology to improve people's lives and find solutions to future challenges.

Tackling disinformation

A further project, backed by £18 million government investment, through the Strategic Priorities Fund, will tackle some of the dangers of the online world from privacy abuses and wrongful use of data like disinformation and online fraud.

The initiative will help provide solutions to some of the issues identified in the government's Online Harms White Paper, which sets out plans for world-leading legislation to make the UK the safest place in the world to be online. The project will help understand what businesses and individuals need to reduce the harm they are exposed to by using online platforms and will aim to develop more trustworthy technology.

This will help to prevent incidents of online fraud, phishing emails, impersonating organisations online and viruses or other malware like ransomware, which cost the UK economy millions of pounds in lost productivity.

UK Research and Innovation Chief Executive, Professor Sir Mark Walport said:

> It is crucial that our citizens and businesses are able to access digitally secure products and services that are not vulnerable to cyber threats.
>
> The investments announced today will help to ensure the UK has a robust system in place to withstand cyber threats and create a safer future online, increasing trust and productivity in our economy.

Arm chief architect and Fellow Richard Grisenthwaite said:

> Achieving truly robust security for a world of a trillion connected devices requires a radical shift in how technology companies

> approach cyber-threats. Research into new ways of building inherently more cyber-resilient chip platforms is critical.
>
> Our first step is to create prototype hardware, the Morello Board, as a real-world test platform for prototype architecture developed by Arm that uses the University of Cambridge's CHERI protection model. It will enable industry and academic partners to assess the security benefits of foundational new technologies we're making significant investments in.

This investment comes in addition to £1.9 billion the government is already investing through its National Cyber Security Strategy to make the UK the safest place to live and work online.

Prosperity Partnerships

The government is also supporting a new 'Prosperity Partnership' between Toshiba Research Europe, University of Bristol, GCHQ and Roke Manor Research to develop more resilient wireless networks through new techniques to detect future threats and mitigate their effects – including financial extortion, terrorism and damaging or destroying established systems.

The pioneering project between Toshiba Research Europe and the University of Bristol, is one of six new collaborations announced by the government today, with £40 million government, industry and university investment into Prosperity Partnerships that aim to transform the way people live, work and travel.

Delivered by UK Research and Innovation (UKRI), major industry leaders, including Jaguar Land Rover, Eli Lilly and Company, Toshiba Research Europe, Microsoft, M Squared Lasers, Siemens and Nikon will team up with world-renowned universities and academics to help develop the technologies of the future.

Secure Wireless Agile Networks (SWAN) Academic Lead Professor Mark Beach of the University of Bristol said:

> The wireless networks that underpin so much of modern life are increasingly vulnerable to both cyber-attacks and other induced failures.
>
> This partnership aims to develop secure wireless networks that are resilient to these threats, protecting individuals, businesses and society at large through Secure by Design methodologies.
>
> Secure Wireless Agile Networks (SWAN) and the wider Prosperity Partnership initiatives bring together a cadre of engineers from industry, government and academia with invaluable commercial insights and in-depth technical skills capable of delivering holistic solutions for a productive, healthy, resilient and connected nation.

> This UKRI scheme uniquely brings together partnerships who are ideally positioned to deliver technology for the wider benefits of society.

Other projects include significantly reducing the time and cost of producing new drugs, speeding up new treatments for a range of conditions and developing the next generation of cleaner, low-emission hybrid vehicles.

The other new partnerships will:

- Provide UK motorists with access to affordable electrified vehicles: Jaguar Land Rover and the University of Oxford are teaming up to accelerate the UK's transition to zero emissions by researching the next generation of world-leading cleaner hybrid powertrains. As a result of the programme, the enhanced vehicles will significantly improve air quality, lower fuel bills and reduce emissions, helping the UK meet its net zero ambitions by 2050.
- Allow doctors to spend more time with patients and reduce healthcare delays: A five-year partnership between Microsoft and the University of Cambridge aims to improve and enhance Artificial Intelligence (AI) through simplifying development and reducing errors, helping to transform sectors including healthcare and gaming, as well as improve business productivity. The project has the potential to help designers build better gaming experiences, improve how staff communicate and work in businesses around the world, and reduce healthcare delays for patients.
- Powering Quantum Computers: M Squared Lasers and the University of Strathclyde will develop a new approach to scale up quantum computing by developing a system to handle large numbers of qubits, the tiny particles which will power quantum computers. The approach could accelerate drug design and improve healthcare, design new materials for aerospace and engineering, reduce traffic congestion on our roads and improve efficiency in distributing energy to homes and businesses.
- Detecting life-threatening diseases like cancer: Nikon and UCL will partner to combine new techniques to gain more information from X-rays – akin to the transition from black and white to colour photography – putting the UK at the forefront of X-Ray Imaging (XRI). The partnership would have major repercussions across a range of sectors from medicine to security to manufacturing, aerospace and cultural heritage, including reducing false alarms at airport security and detecting life-threatening illness.
- Reduce the cost and time to produce drugs and speeding up new treatments: Eli Lilly and Company and Imperial College London will develop advanced techniques for the rapid development of new drugs with fewer adverse effects to treat a range of illnesses and conditions. The partnership will put the UK at the cutting-edge of expertise and innovation of commercial pharmaceuticals and significantly benefit patients.

Prosperity Partnerships support existing strategic, research-based collaborations between business and universities to deliver societal and

economic impact. The five-year partnerships announced today are supported with almost £18 million government funding, nearly £18 million from industry partners and £4 million from universities.

To date, 29 partnerships have received £195 million from the government, industry and universities.

Notes to editors

Around a third (32%) of businesses and two in ten charities (22%) report having cyber security breaches or attacks in the last 12 months (DCMS Cyber Security Breaches Survey 2019. The most common types are:

- phishing attacks (identified by 80% of these businesses and 81% of these charities)
- others impersonating an organisation in emails or online (28% of these businesses and 20% of these charities)
- viruses, spyware or malware, including ransomware attacks (27% of these businesses and 18% of these charities).
- Arm's government-funded project will span a 5-year period and involve software companies, tools developers and leading academic institutions – including Cambridge University and Edinburgh University. Industry and academia will have the opportunity to test the new technology through a prototype called the 'Morello Board.'
- The £36 million funding forms part of the government's Industrial Strategy Challenge Fund – through which it has teamed up with major industry names including Google and Microsoft to tackle some of the most damaging cyber security threats faced by the UK.

In April 2019, the government published the Online Harms White Paper

About the Strategic Priorities Fund:

- The Strategic Priorities Fund supports high quality research and development priorities. This is the second wave of funding. The SPF Wave 2 total programme funding allocation is £496.8m.

About the Industrial Strategy Challenge Fund

- The £36 million of government funding Digital Security by Design challenge will be delivered by UK Research and Innovation through the Industrial Strategy Challenge Fund.
- The UK government is fully committed to defending against cyber threats and address the cyber skills gap to develop and grow talent. A 5-year National Cyber Security Strategy (NCSS) was announced in November 2016, supported by £1.9 billion of transformational investment.
- The World Economic Forum Risks Report 2018 lists data fraud/theft and cyber-attacks as a key global risk.
- You can read more about joint government-Industry investment in cybersecurity here: https://www.gov.uk/government/news/global-businesses-including-google-and-microsoft-back-uk-to-block-cyber-threats-with-new-tech

Summaries of Prosperity Partnerships:

Transforming Synthetic Drug Manufacturing: Novel Processes, Methods and Tools

Led by: Eli Lilly and Company and Imperial College London

Partner: UCL

The discovery of new molecules is crucial to the development of new medicines, but the process is both long and costly, with the total cost per new chemical entity reaching $2.6 billion and ten years. Combining expertise from academia and the pharmaceutical industry, the partnership aims to break down barriers to the cost and time-effective manufacturing of synthetic drugs. To do so, they will develop advanced techniques for drug substance crystallisation and purification, advanced manufacturing and stability analysis of drug products, and cross-cutting systems engineering methods.

The partnership aims to benefit patients through the rapid development of new drugs to treat a range of illnesses and conditions and position the UK at the cutting edge of expertise and innovation in the manufacturing of high-value synthetic drugs, contributing to the growth of a value-creating innovation ecosystem.

Secure Wireless Agile Networks (SWAN)

Led by: Toshiba Research Europe and the University of Bristol

Partners: Roke, GCHQ

Wireless access is essential to the networks that underpin modern life, but many networks are vulnerable to cyberattacks carried out for reasons such as financial extortion, terrorism or subversion. The partnership will work towards the creation of Secure Wireless Agile Networks that will be resilient to both cyber-attacks and accidental or induced failures, such as jamming.

The partnership will identify how the Radio Frequency (RF) interfaces that wireless networks rely on can be attacked and develop techniques to detect RF cyber-attacks and mitigate their effects. Radios whose RF characteristics can be updated to deal with new threats and enabling technology which allows data to be shared efficiently and safely will also be a subject of the research.

Machine Learning for Tomorrow: Efficient, Flexible, Robust and Automated

Led by: Microsoft and University of Cambridge

AI is making huge progress in real world applications from speech translation to medical imaging. Whilst we know AI has the potential to transform sectors including healthcare and gaming as well as improve overall business productivity, we must not forget we are still in the early stages of its development.

This 5-year partnership aims to find efficiencies in using data, ways to simplify model development, as well as reduce errors and bias in real-world

applications. It will do this by improving the fundamental mathematical and computational foundations of AI.

Building on the deep collaborative academic-industry partnership between Microsoft and the University of Cambridge, we aim to realise the potential of artificial intelligence to enhance the human experience and to nurture the next generation of AI researchers and talent. Investment in research and innovation is vital in helping design trustworthy and responsive AI.

Scalable Qubit Arrays for Quantum Computing and Optimisation

Led by: M Squared Lasers and University of Strathclyde

Quantum computers will be far more powerful than the technology of today, promising impact in areas such as quantum chemistry for improved drug design or the designing of new materials for aerospace and engineering. One major barrier is the development of a system which can handle large numbers of qubits, the tiny particles which will power quantum computers, with low levels of noise or interference.

This partnership will combine advanced laser systems with cold-atom and quantum algorithm expertise to develop Scalable Qubit Arrays (SQuAre), a new approach based on reconfigurable arrays of neutral atoms that offers a route to scalable quantum computation and aims to place the UK at the forefront of the rapidly-growing field of neutral atom quantum computation.

Nikon-UCL Prosperity Partnership on Next-Generation X-Ray Imaging

Led by: Nikon X-Tek Systems and UCL

X-Ray Imaging (XRI) has a fundamental role in a wide range of sectors and industries, from medicine and security to manufacturing, aerospace and cultural heritage. Combining phase-based XRI with energy-resolved “colour” XRI could greatly increase the amount of information that can be obtained from any imaged sample. Phase-based XRI allows more information to be gathered from X-ray images than is currently possible while also detecting features that are considered to be ‘x-ray invisible’, and energy-resolved XRI is a transformation akin to the transition from black and white to colour photography.

The partnership aims to place the UK at the forefront of this major change in XRI that could have major repercussions across a range of sectors, from medical scans to industrial inspections.

Centre of Excellence for Hybrid Thermal Propulsion Systems

Led by: Jaguar Land Rover and University of Oxford

Partner: University of Bath, Siemens Digital Industries

This partnership will accelerate the UK’s transition to zero emission mobility by researching the next generation of world-leading electrified hybrid powertrains, as the next step on the UK’s Road to Zero. The centre

will develop hybrid propulsion simulation and examine low-carbon fuels in highly-efficient thermal propulsion systems and electric motors, while minimising demand on the electricity grid and preparing for future fuels. Ultra-high efficiency zero well-to-wheel emission vehicles are in-line with Jaguar Land Rover’s Destination Zero vision for a world of zero emissions, zero accidents, and zero congestion.