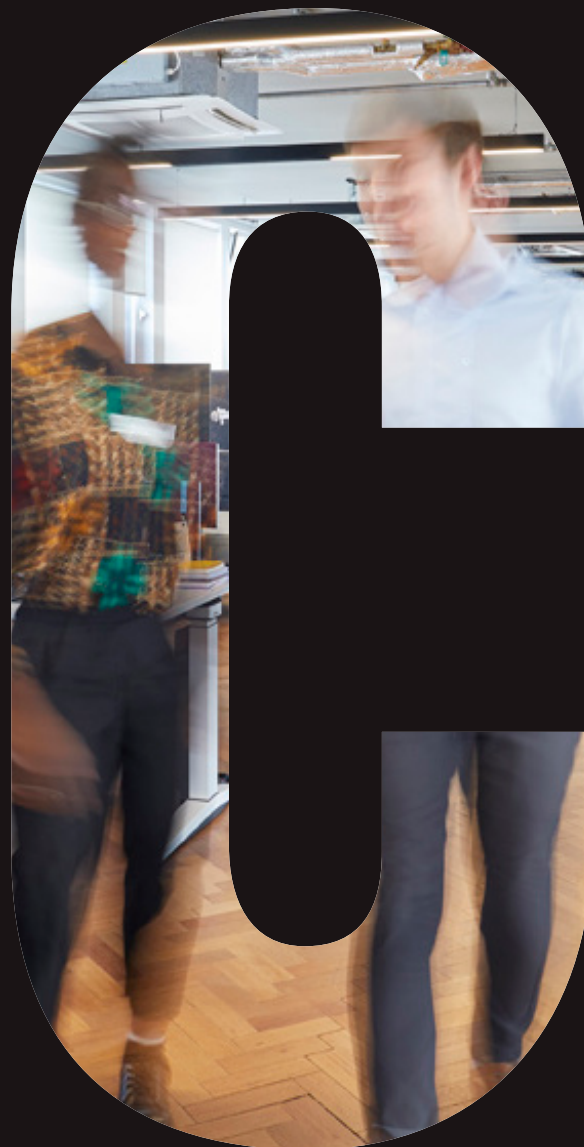


ACE

Accelerated
Capability
Environment

Powered by
vivace


Home Office





INNOVATION

COLLABORATION

ENGAGEMENT

IMPACT

PACE

Accelerating ideas into impact

The Accelerated Capability Environment (ACE) is a Home Office unit within the Homeland Security Group that solves public safety and security challenges arising from rapidly changing digital and data technologies. It brings together expertise from industry and academia – through its Vivace community – to innovate collaboratively and deliver front-line mission impact at pace.

ACE is a partnership between the public and private sectors. Its Vivace community comprises several hundred organisations which provide a diverse range of capabilities that can be quickly deployed to solve the problems brought to ACE. The majority of these organisations are SMEs and start-ups.



MISSION FOCUS

ACE was conceived as a mission-led capability to address urgent, complex problems and deliver meaningful impact at pace.

Being mission-led means to always look at the challenges that are brought to ACE from the perspective of the outcome and impact we will deliver to those on the front line.

A partnership between public and private sectors

ACE is powered by Vivace, a community of multi-disciplinary experts drawn from industry and academia who collaborate to deliver highly innovative solutions at pace. More than 70% of this curated community is comprised of SMEs and start-ups.

The key benefits of ACE's Vivace community are:

- Access to cutting-edge expertise and capabilities from pioneering companies and researchers for ACE customers
- Breadth of thinking and perspective from organisations spanning security and public safety, but also other innovative sectors
- Opportunities to work with government for organisations that might have been too small to be directly contracted

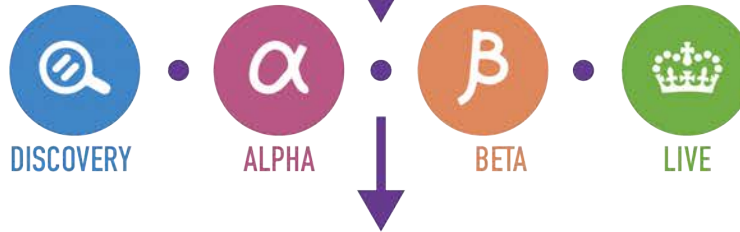


HOW ACE WORKS

A partnership between public and private sectors



MISSION USERS



Solving public safety and security challenges across government

Using best expertise and capabilities from industry & academia

MISSION IMPACT

Space to be different

ACE is led and managed separately from the mainstream Home Office so that it can have autonomy of innovation decision making which assists pace, energy and freedom in problem solving.

ACE has developed contracting mechanisms and secure collaboration and development tools that accelerate delivery of mission impact to a tempo of weeks and months rather than the months and years typical of traditional government procurement.



The environment

ACE has developed the physical and digital environments necessary for fast, effective collaboration and the secure use of sensitive information and data. We have removed many of the barriers that have previously made it difficult for smaller, highly innovative organisations to work with government.

Our secure O365 IT services make familiar, mainstream software available for easy collaboration, communications and information sharing, and allow team members to Bring Your Own Device (BYOD).

Our PodDev secure development environment can be used for building capabilities, experimenting and working on data – accredited up to Secret.

The ACE Space in London provides flexible office accommodation for in-person collaboration and workshops with meeting rooms accredited up to Secret, all within easy reach of key government and law enforcement headquarters.



Working with ACE

From the initial engagement ACE works hand in hand with our customers through to the final delivery of a commission.

During the early **assess** stage our engagement team and technical assurers work alongside the customer to understand and help shape their problem.

Our **assign** stage then works on defining the desired outcomes and determine the best approach to deliver them. Our market engagement and delivery teams quickly signal the opportunity to our Vivace community of more than 320 industry and academic organisations. Following a supplier competition, the best proposals are down-selected and successful suppliers engaged for rapid mobilisation. When necessary, this process can be done in a matter of days.

Our delivery team then manage the commission according to the ACE **deliver** process, adopting agile methodology by default. Under the direction of a dedicated delivery lead, a controlled but fast-paced tempo is maintained throughout delivery driving towards the agreed outcomes. During the deliver phase, our tech team provide hands-on expertise and capabilities, practical problem-solving and technical assurance to ensure best practice and compliance.



Engaging ACE

ASSESS

- Mission problems captured in the Problem on a Page (PoP)
- Budget, timescales and mission impact determined
- Suitability of project for ACE assessed

ASSIGN

- ACE engages the Vivace Community
- Responses are assessed and the best selected
- Approach is set out and costed in the Commission Order Form (COF)

DELIVER

- Agile methodology used to deliver commissions
- Delivery Manager coordinates and oversees the commission
- Tech Lead sets out a technical delivery plan
- Data sharing agreements put in place when needed
- At the end of a commission, all deliverables are handed over to the customer
- Governance and assurance by ACE Tech Assurers and relevant functional leads

Who does what?

CUSTOMER SIDE →

COMMISSION SPONSOR

PRODUCT OWNER

ACE SIDE →

ENGAGEMENT LEAD

TECH ASSURER

DELIVERY LEAD

TECH LEAD

Commission commercials

ACE has developed its commercial mechanisms to enable rapid mobilisation and delivery. Customers outside the Home Office sign a Memorandum of Understanding (MoU) in order to utilise ACE. Once the MoU is in place all departments from within the customer organisation can commission ACE.

Our customer engagement team will help shape the problem with the customer and articulate this on a set Problem on a Page template. ACE will then take this through our own internal governance and review gates. An ACE Commission Order Form (COF) is then created by our team that outlines the problem to be solved and an initial approach to achieving the agreed outcomes, as well as pricing information. The ACE customer is sent the completed COF for their approval of delivery approach, pricing and relevant listed risks, assumptions and dependencies.

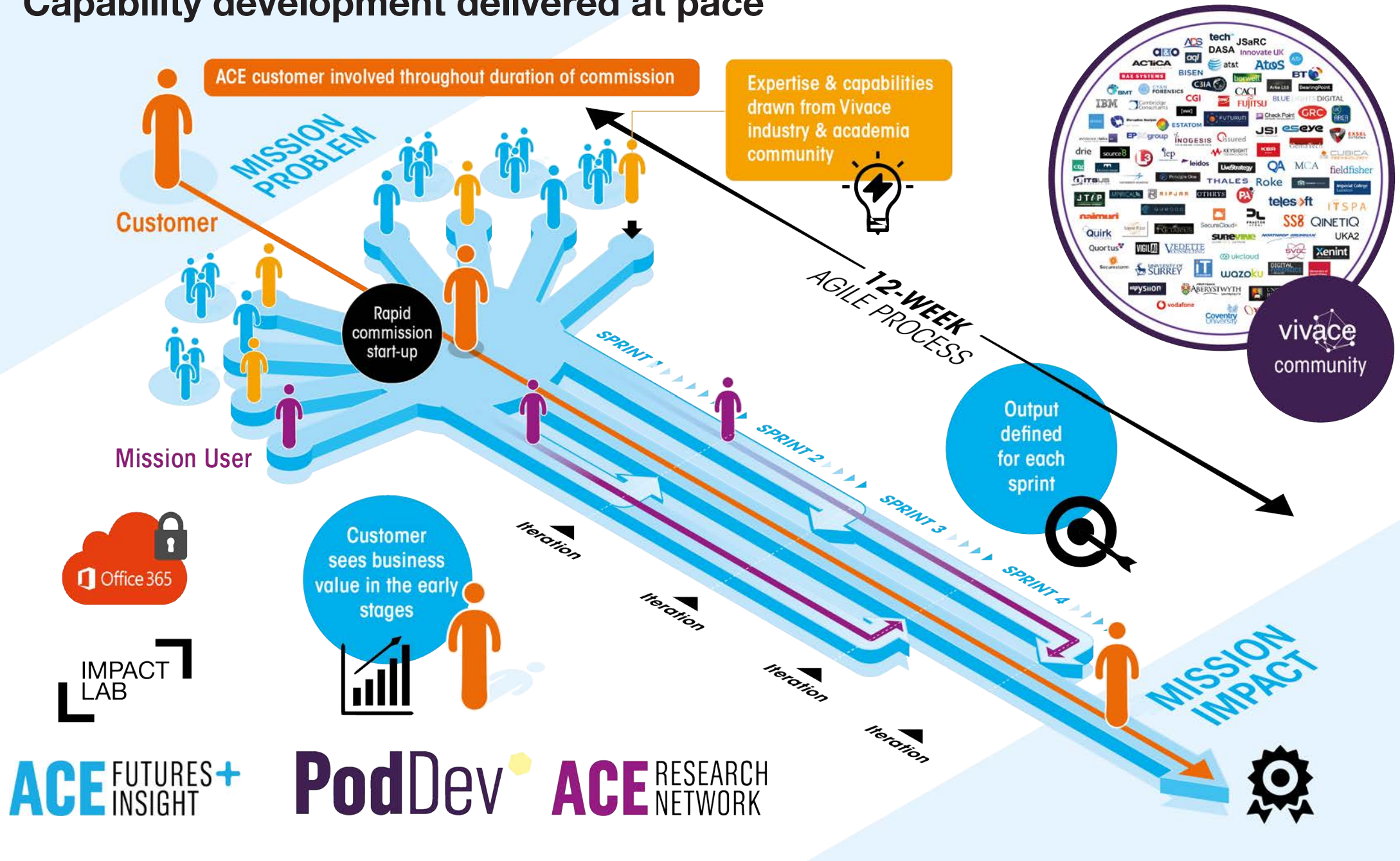
ACE's Private Sector Partner (Vivace) then delivers the necessary enablers and overall commission management on behalf of the Home Office.

The Vivace community are all fully onboarded meaning they can be quickly engaged and mobilised to deliver their capabilities and expertise in order to achieve the planned outcomes.

Changes to commissions and follow-on work can be captured and contracted for in parallel to ongoing delivery via a Commission Variation Notice (CVN) that follows the same basic process as a COF.

Payment milestones are agreed as part of the COF or CVN and invoices are typically raised at the end of each sprint. Payment is made direct from the ACE customer to the private sector delivery partner, reducing the admin burden throughout the chain.

Capability development delivered at pace



Delivering impact

Established in 2017, ACE applies its approach of mission-led innovation to increasingly wide-ranging challenges from across government and other public sector agencies.

Ace has delivered impact across a broad range of public sector challenges including:

- Contributing to the reduction of violence against women and girls
- Maritime situational awareness
- Online harms and child sexual abuse and exploitation
- Cyber crime and cyber security
- Modern slavery and human trafficking
- Critical national infrastructure threats
- Implementation of new data-oriented investigatory powers
- Use of artificial intelligence to drive NHS efficiency and improve patient outcomes
- Supporting the response to the Covid-19 pandemic



Delivered by ACE since 2017:

£120m value of work

261 projects

300+ companies in Vivace community

IMPACT LAB

Igniting front-line innovation

ACE developed Impact Lab to bring the smartest innovative thinking to the real operational problems confronting frontline policing.

Each Impact Lab event focuses on a closed case, giving participants access to the investigating police team who reveal the challenges they faced, provide intelligence insights and share real data.

This data and intelligence is then used to experiment and develop solutions with the potential to deliver rapid, cost-effective mission impact.

Impact Lab allows participating police forces to discover how cutting-edge technology and thinking could solve pressing operational problems to accelerate investigations and drive efficiencies.

Participating organisations from ACE's Vivace supplier community get:

- Access to real operational data
- Access to officers who investigated the case
- Opportunity to pitch to senior police chiefs
- Opportunity to win paid work to develop best solutions



ACE FUTURES+ INSIGHT

INCISIVE INTELLIGENCE

The ACE Futures and Insights team provides a Horizon Scanning service that captures and contextualises breaking events and emerging narratives with a focus on digital, data, technology and transformation.

Supported by the Vivace community and a broader 'team of teams' research network, we scan across STEM, public affairs and management domains to gather technology futures into a structured analytical framework. Service highlights are showcased in a fortnightly ACE Insights email.

ACE RESEARCH NETWORK

ACADEMIC PERSPECTIVES

The ACE Research Network (ARN) was launched in 2020 to increase academic participation in ACE commissions and make it easier for university departments to engage with ACE. We have built a network of contacts across disciplines ranging from hard and social sciences to computing and ethics.

We have more than 166 academics from 72 leading universities engaged in some way with ACE.



CASE STUDY

An end-to-end approach to tackling financial crime

ACE's Economic Crime campaign took a holistic view of the end-to-end process of investigating financial crimes. It looked at where data and technology offer opportunities for improvements at both short-term tactical and longer-term strategic levels.

It brought together senior stakeholders and operational practitioners to test and validate solutions brought forward from participating members of ACE's Vivace community.

The Gold Group of senior stakeholders— consisting of representatives from government, law enforcement and industry – provided continued input to the direction, relevance and value of the work.

The campaign relied on ACE's ability to create a collaborative environment where practitioners and industry can work together to understand problems and provide creative solutions. It has focused on developing ideas in four key themes that were identified through a series of workshops.

Digital Production Order – maximising the accessibility and usability of financial data

Investigators need to be able to access financial transaction data from multiple organisations under authority of a crown court judge in order to respond effectively to the report of a crime. However, existing methods are largely manual, time-consuming processes. The concept of a Digital Production Order was developed to automate communication with courts and financial institutions through a managed process that ensures data is in a suitable format.

Model Office - An environment for experimentation

The 'Model Office' provided an environment for experimentation and sharing a problem area based on a narrative that provided a detailed case study of a typical financial crime case in a way easily understood by industry.

It offered representative data against which Vivace suppliers could demonstrate the art of the possible.

Financial crime app – pushing knowledge to the front line

Police officers have a vast amount of legislation to understand and apply in different circumstances. In the last 20 years new legal powers have been provided to help the fight against economic crime.

The campaign identified the very tactical problem of front-line officers being able to quickly understand and apply this less frequently used legislation. A phone application was launched in 2020 which puts cyber crime information into the pocket of police officers.

The campaign was able to rapidly bring together the parties involved in managing the app and the information needed by officers to correctly use the Proceeds of Crime Act, resulting in an enhanced application.

CASE STUDY

Accelerating data-driven insights from wastewater



The pandemic spurred interest – and funding – in the potential of Wastewater-Based Epidemiology (WBE) as an early warning system which could help the government stay ahead of new disease outbreaks. ACE worked extensively with the Joint Biosecurity Centre's Environmental Monitoring for Health Protection team, now part of the UK Health Security Agency (UKHSA)

ACE supported design of an operating model for a scalable and sustainable national wastewater capability which makes best use of WBE data for environmental monitoring, health protection and national security interests.

To underpin this, ACE led an extensive commission involving 32 programmes, 84 discrete projects and 63 suppliers from our Vivace community, focused primarily on accelerating technology and research to increase the quality and range of collected data to provide actionable insights.

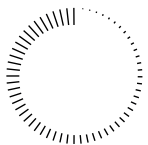
Working capabilities demonstrated included:

- The SewerSafe app, which could inform the sampling strategy for sentinel and upstream tracing. This uses sewer networks and hydraulic models to identify optimal sampling points.
- A Mobile Testing Unit which took laboratory equipment to the point of wastewater sampling to provide results in under four hours, a near twentyfold reduction on typical time taken to obtain results requiring chilled transportation.

- The capability of post-pandemic sensors which will enable wider data analysis. Near-real-time detection included innovation such as harnessing quantum nano diamonds to increase the limits of detection using lateral flow type 'dip-sticks'.
- A no-chill transport solution using electronegative filter papers for viral load transportation, providing a cost-effective no-chill solution that has global exploitation potential.
- End-to-end automation, realised through development of an innovative robotic system based on a 3D printer with capabilities to provide onsite results when integrated with an auto sampling system.

Practical trials at universities and at a city level were used to assess commercial models and the ability to localise the source of an infection. A major success was at the care homes trial, where Covid was identified in wastewater outside routine testing, leading to the early identification and isolation of those infected, reducing the spread and protecting elderly and vulnerable residents. This was developed as a commercial service, showing the ability to scale and regulate WBE operations in the private sector.

Overall, the WBE commission delivered £18million of innovation with savings and co-investment of £5million, and accelerated technology development for automating on-site detection by three to five years.



84 projects and
63 suppliers

CASE STUDY

Creating a safer internet for children



ACE was commissioned by GCHQ and supported by DCMS and the Home Office, to run a cross-sector research project to provide insights to Government on how children could be kept safer online. By bringing together experts from across the spectrum it was able to stimulate innovation and collaboration.

In partnership with its Vivace industry community and GCHQ's child sexual exploitation and abuse (CSEA) team, ACE created a cross-sector task force to explore the hypothesis that "if platforms could verify which of their users were children, then as a society we would be better empowered to protect children from harm as they grow up online".

The task force included experts in technology, privacy and law enforcement, child protection specialists and government policy makers, as well as third-sector child safety organisations such as UNICEF and the NSPCC and representatives from major technology and social platforms.

The project had two phases. For phase one the taskforce met fortnightly for 10 weeks, holding five workshops and one round table as part of a high-energy, fast-paced commission to explore the VoCO hypothesis from multiple perspectives including ethics, children's rights, education, digital parenting, safer by design standards and regulatory oversight, with an overarching theme of preserving privacy.

Discussions were also informed by 'action research' that went on in parallel, including landscape analysis, child / parent use cases, market analysis and work seeking to define the existing, emerging and trial technical solutions in the VoCO space.

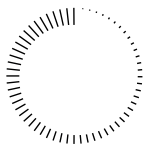
Phase one also explored the need for a coherent partnership between platforms, parents and children, balancing the right of young people to benefit from all the internet has to offer, while also having the right to be kept safe.

A range of promising solutions were identified for further exploration and trialling, and a product/ solution scoring system developed. Six leverage points were identified across ISPs, devices and platforms where verification could take place.

The commission also identified and worked with a number of innovators in the child age verification space. This included paper-based assessments against the criteria from the product selection work and a real-world end-to-end trial of a prototype technology with parents and children.

The task force delivered a phase one report with ten key recommendations designed to help find a workable, practical solution focused on preserving privacy that will make a real difference to the age verification of children online, help protect them from sexual abuse, and inform other online safety and privacy consultations.

The second phase of the commission aimed to further test the theoretical and practical aspects of VoCO by providing valuable research and demonstrable practical proof of concepts to help inform wider government initiatives where VoCO and the aim of making children safer online is an underlying foundation.



10 weeks of
fortnightly
workshops

CASE STUDY

AI to help radiologists compare scans more effectively



ACE worked with the NHS to explore how AI could be used to help radiologists quickly compare and assess consecutive CT scans.

Radiologists at George Eliot Hospital NHS Trust, which serves more than 300,000 people across Warwickshire, Leicestershire and Coventry, perform around 60 scans each day. Many of these are related to cancer, and in most cases a comparison with a previous scan is necessary to assess lesion growth or shape changes. This manual alignment and comparison is labour intensive, but no suitable automation tools exist.

Automating this process and improving alignment and overlay would enable slight changes in volume or new lesions to be picked up more quickly, with a scan report guiding radiologists to review or further evaluate particular regions. Increased accuracy would improve patient safety and outcomes by allowing faster diagnoses, and successful automation would also save radiologist time.

Roke from ACE's Vivace community was chosen as the supplier for this commission and delivered a Proof of Concept (PoC) in just 12 weeks.

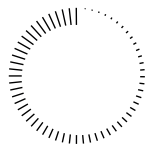
The PoC uses AI to automatically overlay images, compensating for factors including movement and breathing as well as body-composition changes frequently found in these patients. The tool calculates potential anomalies in three dimensions, allowing volume changes in lesions, or new lesions, to be quickly identified.

It was trained on anonymised CT scan data from 100 patients supplied by the hospital which also included machine data on body part positioning and the angle of scan.

Roke developed the Graphic User Interface (GUI) visualisation tool by breaking the problem down into three key areas covering alignment, tissue sectioning, and anomaly detection, which Roke termed the 'Holy Grail'.

As part of validation testing, lesions were successfully detected in seven out of nine patients, and in 10 out of 17 images.

Roke also developed a masked data deep learning approach, trained on human body composition, which fills in what it thinks should make up any given area. This can then be compared to the actual scan, with the difference between prediction and reality helping identify a lesion and score the degree of anomaly.



Lesions were
successfully detected
in 7 out of 9 patients

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