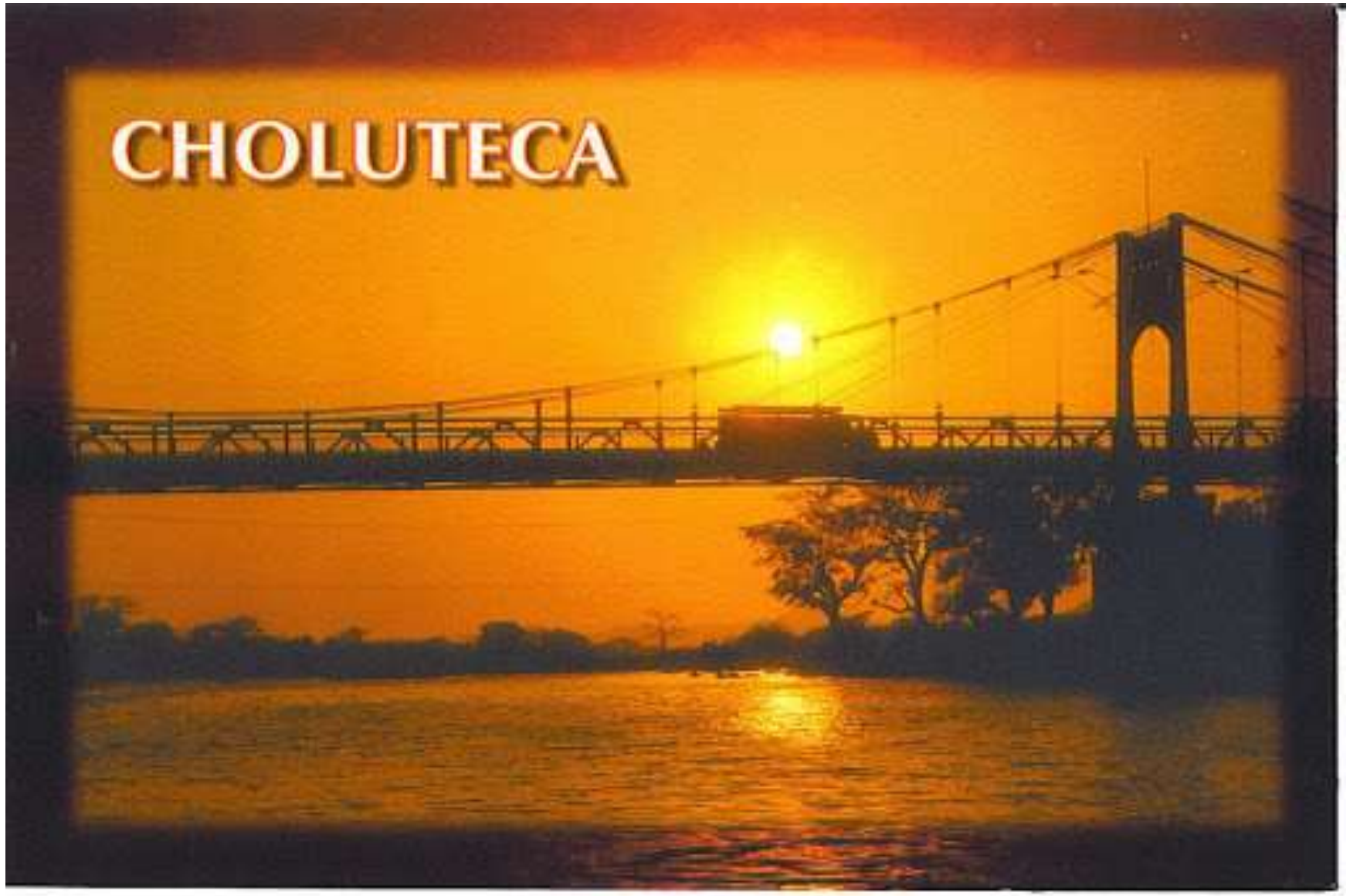
Collaborating with industry and researchers to deliver improved healthcare

Dr Charlie Davie, Managing Director, UCLPartners

UCLPartners
Academic Health Science Partnership



UCLPartners
Academic Health Science Partnership

UCLPartners – a partnership organisation

6 million

population

46

Healthcare organisations and clinical commissioners

11

Higher education partners

844

primary care practices

100s

industry partnerships

6

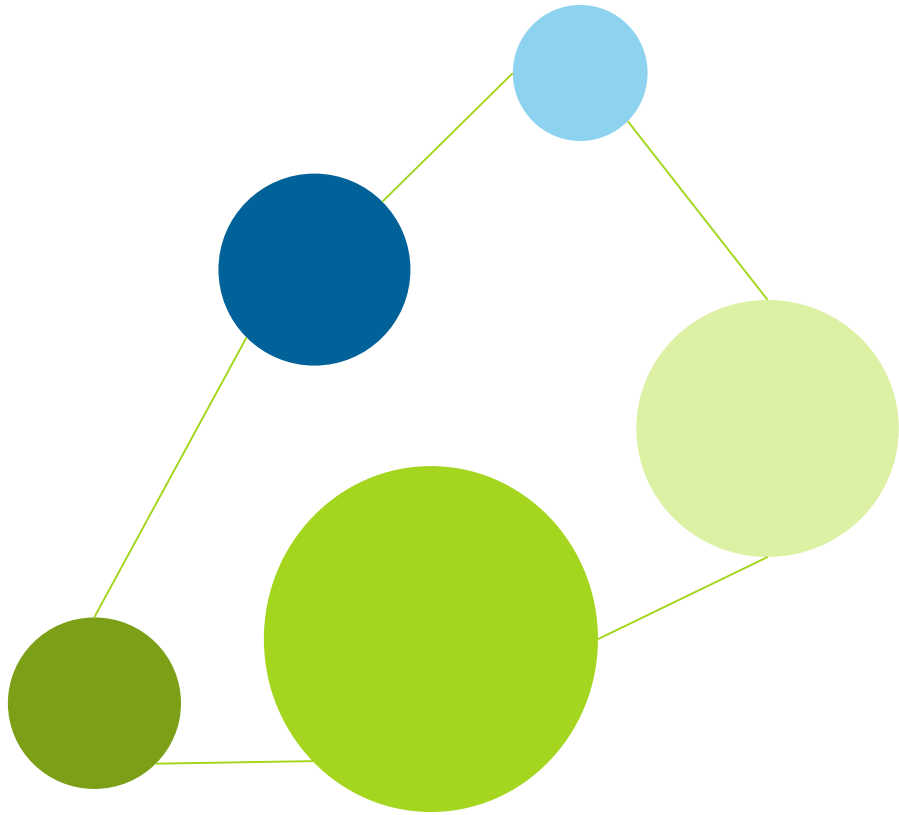
Sustainability and Transformation Partnerships

Parts of London, Bedfordshire, Hertfordshire and Essex

A unique business model

UCLPartners aligns the following functions in one partnership:

- Academic Health Science Centre (AHSC)
- Academic Health Science Network (AHSN)
- NIHR Collaboration for Applied Health Research and Care (CLAHRC/ARC)
- Commercial Trials Prime Site
- NIHR Clinical Research Network (CRN)
- Genomic Medicine Centre

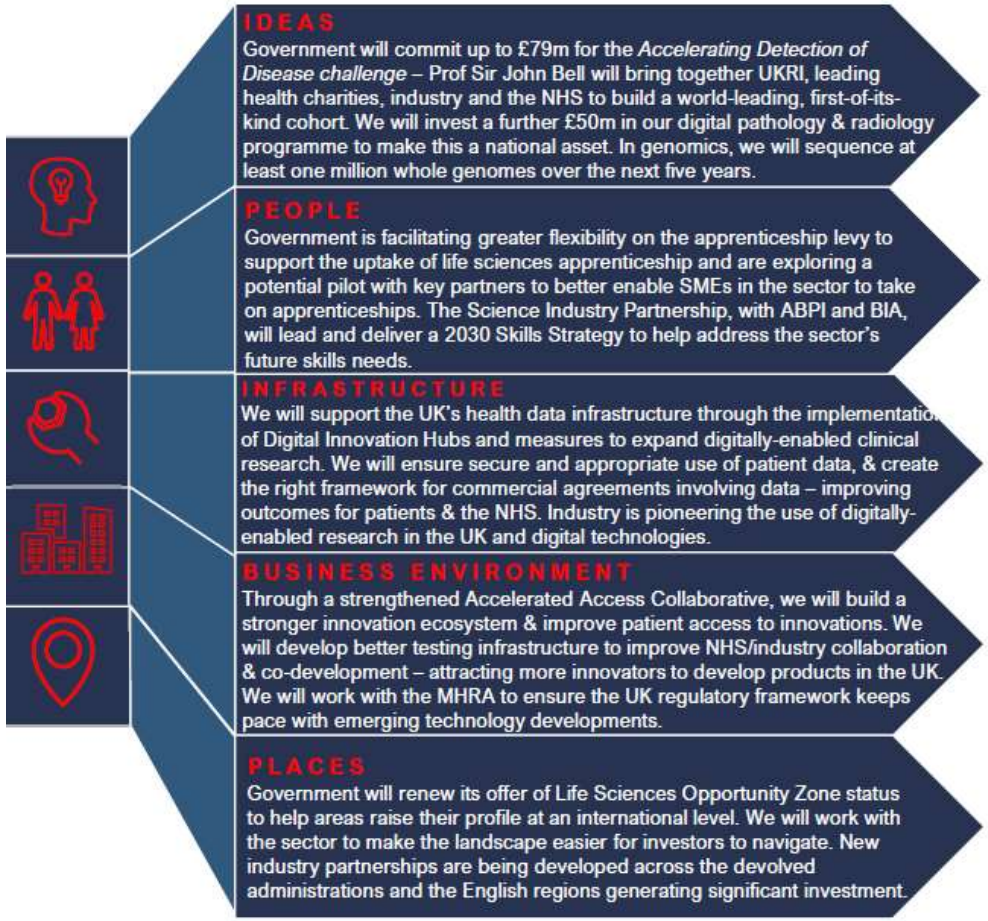


Life Sciences Industrial Strategy

- **Science**: Continued support for the science base, maintaining strength and international competitiveness.
- **Growth**: An environment that encourages companies to start and grow, building on strengths across the UK, including expansion of manufacturing in the sector.
- **NHS**: NHS and industry collaboration, facilitating better care for patients through better adoption of innovative treatments and technologies.
- **Data**: Making the best use of data and digital tools to support research and better patient care.
- **Skills**: Ensuring that the sector has access to a pool of talented people to support its aims through a strong skills strategy.

LIFE SCIENCES SECTOR DEAL 2

Key commitments:



IDEAS

Government will commit up to £79m for the *Accelerating Detection of Disease challenge* – Prof Sir John Bell will bring together UKRI, leading health charities, industry and the NHS to build a world-leading, first-of-its-kind cohort. We will invest a further £50m in our digital pathology & radiology programme to make this a national asset. In genomics, we will sequence at least one million whole genomes over the next five years.

PEOPLE

Government is facilitating greater flexibility on the apprenticeship levy to support the uptake of life sciences apprenticeship and are exploring a potential pilot with key partners to better enable SMEs in the sector to take on apprenticeships. The Science Industry Partnership, with ABPI and BIA, will lead and deliver a 2030 Skills Strategy to help address the sector's future skills needs.

INFRASTRUCTURE

We will support the UK's health data infrastructure through the implementation of Digital Innovation Hubs and measures to expand digitally-enabled clinical research. We will ensure secure and appropriate use of patient data, & create the right framework for commercial agreements involving data – improving outcomes for patients & the NHS. Industry is pioneering the use of digitally-enabled research in the UK and digital technologies.

BUSINESS ENVIRONMENT

Through a strengthened Accelerated Access Collaborative, we will build a stronger innovation ecosystem & improve patient access to innovations. We will develop better testing infrastructure to improve NHS/industry collaboration & co-development – attracting more innovators to develop products in the UK. We will work with the MHRA to ensure the UK regulatory framework keeps pace with emerging technology developments.

PLACES

Government will renew its offer of Life Sciences Opportunity Zone status to help areas raise their profile at an international level. We will work with the sector to make the landscape easier for investors to navigate. New industry partnerships are being developed across the devolved administrations and the English regions generating significant investment.

INDUSTRIAL STRATEGY

HM Government

What is the Life Sciences Sector Deal 2?

The second Life Sciences Sector Deal continues to drive forward the joint commitments of government and the sector to make the UK a global leader in life sciences, and outlines the strong **progress made since the first Life Sciences Sector Deal** was announced in December 2017:

- We have made an investment of £85m in our already world-leading genomics assets at UK Biobank has launched the world's largest whole genome sequencing project.
- £50m will get five new centres of excellence in digital pathology and radiology off the ground next year to apply AI tools to digital images to detect abnormalities more quickly and accurately than humans.
- A £146m commitment to medicines manufacturing is building an impressive end-to-end national infrastructure for advanced therapies including doubling capacity at the Cell and Gene Therapy Catapult Manufacturing Centre; three new advanced therapies treatment centres; and two new innovation centres for vaccines and medicines manufacturing.
- Supported by £86m of government funding, the government, the NHS and its partners are delivering on their clear commitment to implement the Accelerated Access Review.

Together with the sector, Government is further developing and capitalising on opportunities in new and emerging industries, including early disease detection and genomics, digital technologies and data analytics, and advanced therapies, which look to tackle some of the major challenges that healthcare systems are facing.

The second Sector Deal also highlights how industry continues to show confidence in the UK's R&D strengths, with **£1.2 billion of new investment announced as part of the deal** – including a major £1bn commitment from UCB – which will further strengthen the UK as a world-leading science base.

How can you help?

- Posting social media content and creating your own – digital assets are available at: https://drive.google.com/drive/folders/1M96OgWwLhJ3cGj9pjCWRNdOvJiJtHXQZ?usp=sharing
- Please use the hashtag **#IndustrialStrategy**
- Including content in newsletters, blogs and online (both internal and external)
- Longer term support: host a roundtable or event with stakeholders linked to the life sciences sector and the wider Industrial Strategy

@UK_Life_Science
@beisgovuk
#IndustrialStrategy

The Accelerated Access Review

Aim: To speed up access to innovation and grow the UK life sciences industry

Recommendations in five key areas:

1. Patients, clinicians and charities to be the key drivers in innovation
2. A new accelerated access pathway will prioritise innovations
3. Open and transparent pathways to bring forward medtech, digital and diagnostics
4. Driving innovation through NHS planning, increasing capacity, clinical leadership and incentives
5. A new accelerated access partnership provides a single source of national level guidance and oversees the pathway

£37.5m investment in Digital Innovation Hubs to tackle Britain's biggest health challenges

16.07.18

Faster development of new treatments for diseases like cancer, heart disease and asthma are set to emerge following a £37.5 million investment in new Digital Innovation Hubs across the UK.

The new hubs will help connect regional health and care data with biomedical data in secure environments. This will pave the way for NHS, academic researchers and industry innovators to harness scientific knowledge and emerging technologies to develop new drugs and devices and improve health services.

Funded through the Industrial Strategy Challenge Fund, the Digital Innovation Hubs will be led by Health Data Research UK (HDR UK), the national institute for data science in health, delivering on behalf of UK Research and Innovation.

Between three and five hubs will be created across the UK over the next three years to enable innovation that will have a long-lasting impact on improving the health of the public. The hubs will provide safe, secure and controlled environments for data and enable NHS clinicians to work together with health researchers, data scientists, computer scientists, ethicists, social scientists and the public.

Digital Innovation Hubs - enabling the safe and responsible use of health-related data at scale for research and innovation

The Digital Innovation Hubs are expected to deliver accelerated thematic **digital innovations** through co-located collaborative **hubs** bringing together **academia, industry and NHS**. 'Breathing the same air' they will provide:

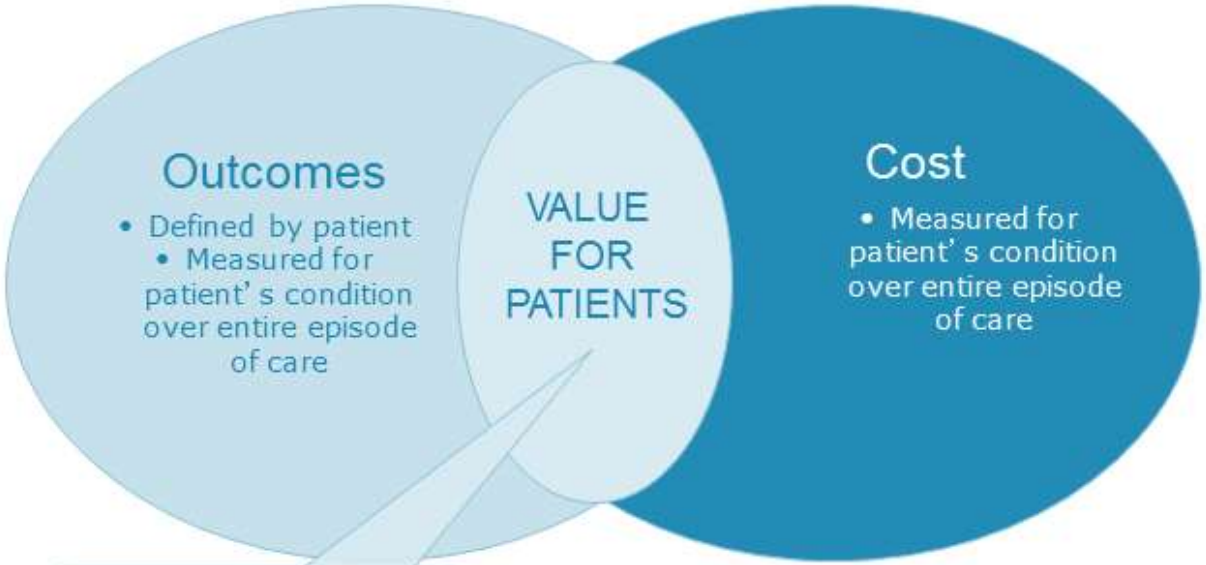
- Deep domain and data science expertise specific to areas of focus
- Information governance, IPR and business model expertise
- Curated high value datasets
- 'One-stop shop' research and innovation services, including study access and costing support
- Secure workspace / safe haven
- Access to Tools and Apps and innovation in research data provision
- Data import and linkage services (e.g., for patient reported outcomes, wellness monitoring)
- Skill building across all relevant disciplines.

Big Challenges - bridging the capability gap

- The NHS Digital Academy is the NHS's first ever nationally funded programme of world-class health informatics training.
- The NHS Digital Academy are providing specialist IT training and development support to 300 senior clinicians and health managers over a 12 month period.
- The aim is to help shape a new generation of Chief Information Officers (CIO) and Chief Clinical Information Officers (CCIO) who can help drive through the digital transformation the NHS requires.

In System leadership, Improvement, IT, data science, Innovation, commercialisation, adoption and spread etc..

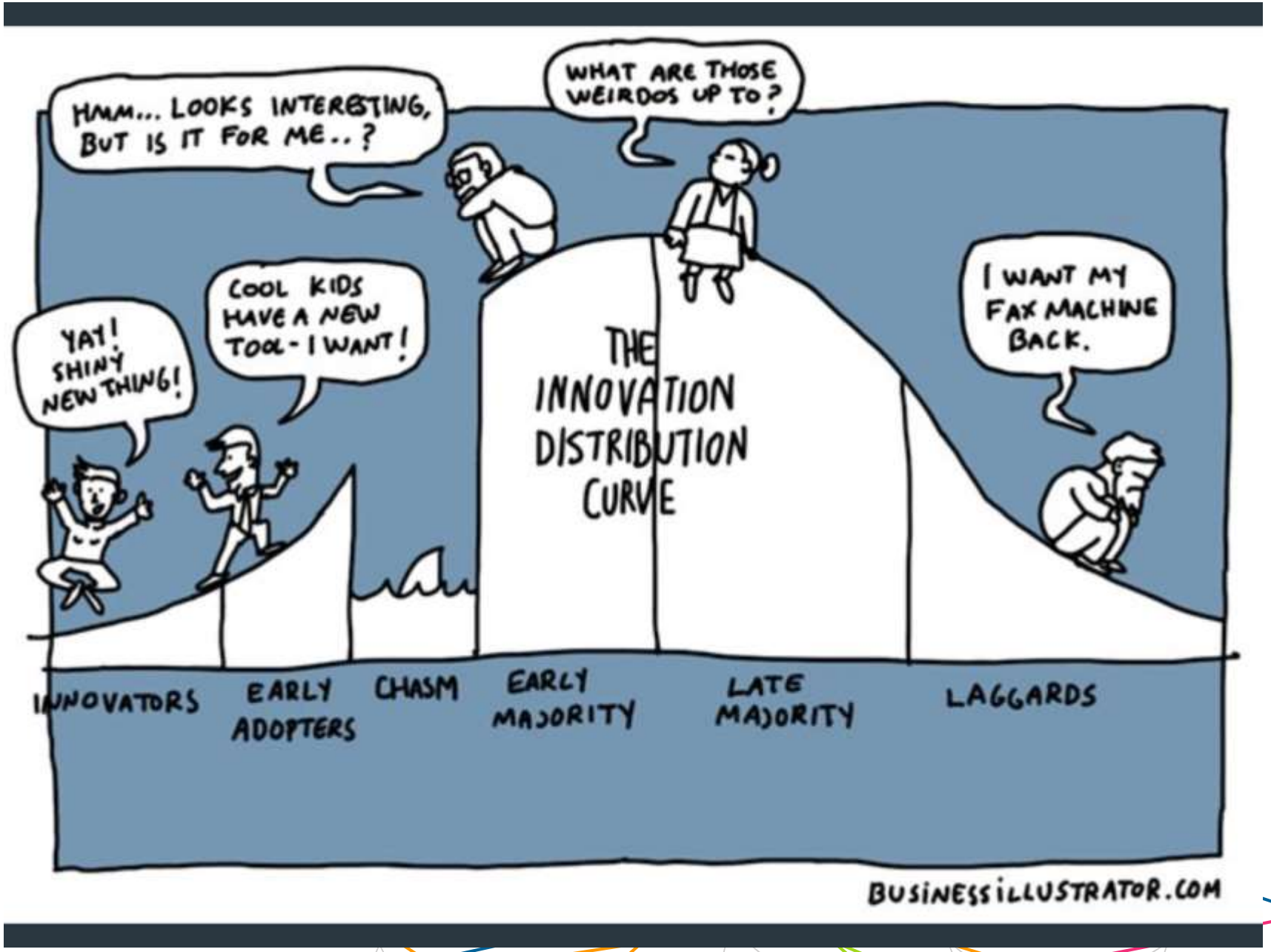
Our overarching goal should be to improve value of care for patients and families, *as defined by patients*



AHSNs: a connected ‘Network of Networks’

The AHSN Network

First licence collective impacts


HMM... LOOKS INTERESTING, BUT IS IT FOR ME..?
WHAT ARE THOSE WEIRDOS UP TO?
YAY! SHINY NEW THING!
COOL KIDS HAVE A NEW TOOL - I WANT!
I WANT MY FAX MACHINE BACK.
THE INNOVATION DISTRIBUTION CURVE
INNOVATORS
EARLY ADOPTERS
CHASM
EARLY MAJORITY
LATE MAJORITY
LAGGARDS
BUSINESSILLUSTRATOR.COM

AHSN Innovation Exchanges

Helping innovative new diagnostic tools, treatments and medical technologies reach patients faster.

Using our established networks and expertise we will:

- Identify priorities and then act as honest brokers across sectors to bring people and organisations together
- Provide the first port of call for information – for example signposting commercial innovators and matching already proven solutions to challenges faced by local NHS organisations
- Share best practice around health and care organisations, and offer expert advice about how to get transformation and innovation adopted
- Identify opportunities for patients to take part in trials and pilots
- Work with health and commercial partners to test out solutions
- Collaborate with the 14 other AHSNs across England to identify what is working best locally, and then scale it nationally.

23 OCTOBER 2018

More patients to be given access to innovative MS treatment through new Government 'rapid uptake' scheme

An innovative Multiple Sclerosis (MS) treatment, brought to market as a result of clinical trials by teams at Barts Health NHS Trust, Queen Mary University of London and University College London Hospitals NHS Trust, has been named as a 'rapid uptake' product to be made accessible to more patients through the Accelerated Access Collaborative (AAC).

The Government is investing £2 million to support greater patient access to these products, all of which have proven clinical effectiveness but are yet to be made available for widespread use in the UK.

Cladribine, a drug traditionally used in an injectable form to treat leukaemia and lymphoma, has been clinically proven to be an effective oral treatment for highly active MS, reducing relapses. Unlike other MS treatments on the market, Cladribine tablets should speed up the treatment time for patients as they can be prescribed more widely and safely be taken at home. This treatment also requires less monitoring by clinical teams, potentially reducing pressure on NHS services.

Local Health and Care Record Exemplar

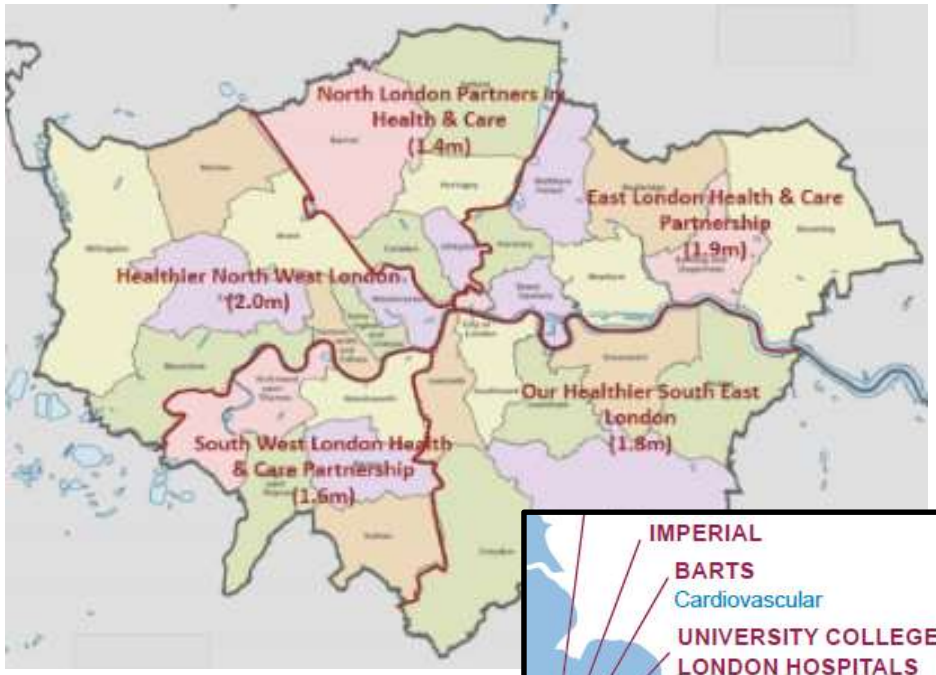
UCLPartners
Academic Health Science Partnership

An opportunity to leverage pan London partnerships

- 32 Local Authorities for London citizens plus GLA
- 3 Academic Health Science Centres and Networks

  AHSNs to be relicensed as NHS 'centrepiece for innovation'

- 3 NIHR Collaborations for Leadership in Applied Health Research and Care (CLAHRCs)
- 8 Biomedical Research Centres
- 5 world leading Universities in pan London HDRUK
- Other research partners
- Smart London & other innovation tech partners



Existing infrastructure, opportunities & sustainability

Three interlocking components:

- **Local Health and Care Record Exemplar (LHCRE)**
  - £7.5M plus matched funding for NHS; 2 years from May 2018
  - no renewal or infrastructure funding from 2020
- **Health Data Research UK (HDRUK)**
  - £6.9M for research and universities; 5 years initially from May 2018
  - no infrastructure funding yet, potential for additional funding for Life Sciences
- **Digital Innovation Hubs (DIH)**

Accelerating innovation

DigitalHealth.London Accelerator

- Aims to speed up the adoption of technology in London's NHS, relieving high pressure on services and empowering patients to manage their health

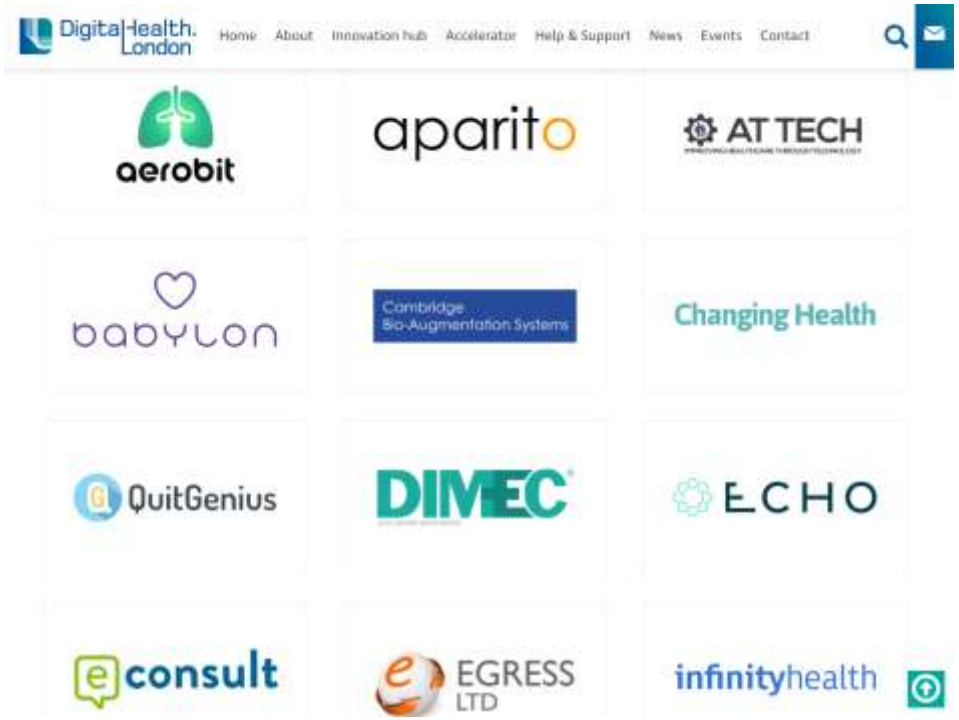
UK Israel Dangoor Health initiative

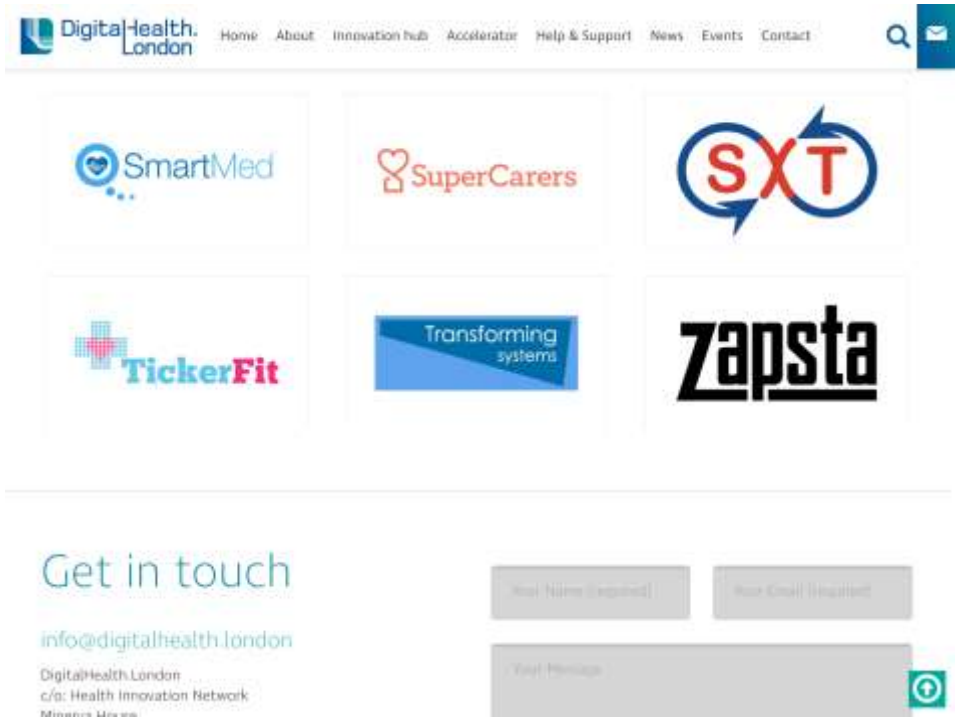
- New health accelerator programme aimed at connecting Israeli startups in the digital health field with the UK NHS

NHS Innovation Accelerator (NIA)

- Aims to help create the conditions and cultural change necessary for proven innovations to be adopted faster and more systematically for patient benefit.

Partnerships - the NHS working with industry





What is the DH.L Evidence Generator

The DH.L Evidence Generator has been designed to facilitate engagement between digital health small and medium enterprises (SMEs) and academics to support the generation of independent evidence to inform and support implementation and rollout. It is sponsored by DigitalHealth.London (DH.L) together with the Health Innovation Network South London (HIN) and MedCity.

Our objectives include:

- development of a better understanding of the research and evaluation needs of digital health innovators and to develop rapid, practical and effective solutions to help meet these needs
- provision of ready access to appropriate research expertise, advice on NHS research governance arrangements and health research infrastructure
- identification of existing research advisory and support services within the member organisations and elsewhere.
- development of mechanisms to facilitate the rapid delivery of approvals and permissions appropriate to the specific requirements of digital health applications.
- development of recommendations regarding governance arrangements for digital health.
- development of mechanisms to ensure that there are benefits for all the different parties engaging with the DH.L Evidence Generator, including patients.

Digital Transformation: Acute

- Moorfields Eye Hospital: Google Deep Mind

- Durham and Nottingham NHS Trusts: NerveCentre

Autolus – developing T-cell cancer therapies

UK-based company Autolus, spunout from University College London in 2014, is developing potentially life-changing T-cell cancer therapies.

Initially supported by UK venture capital from Syncona, Woodford and Arix, and grants awarded by Innovate UK, Autolus recently raised over £120 million in a successful NASDAQ IPO.

- Employs more than 180 people
- Planning further investments of approximately £50 million in the UK
- Planned new facilities and expansion to generate 100 high-value UK jobs

Orchard Theraputics - developing transformative gene therapies

Orchard Therapeutics, founded by UCL researchers, launched its initial public offering (IPO) on the Nasdaq stock exchange in 2018.

Orchard Therapeutics aims to develop transformative gene therapies for immune system and metabolic disorders.

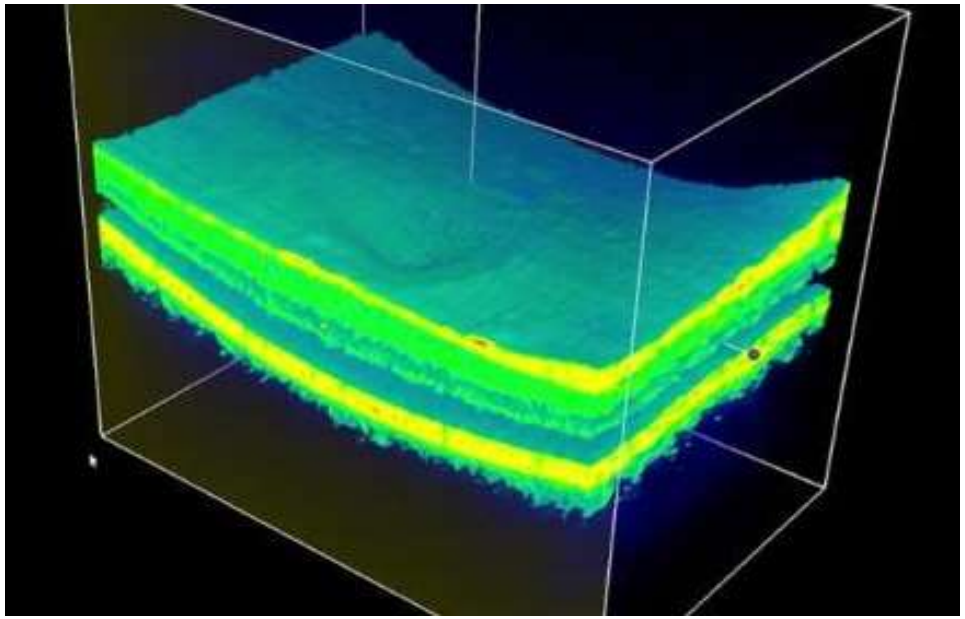
The technologies used by Orchard Theraputics were developed at UCL and GOSH with the support of the NIHR, other funders and international partners.

The company sold 14.3 million shares to raise $225 million of investment.

Google DeepMind – Working with Moorfields to reinvent the eye exam

Manual retinal image analysis today requires highly-trained, experienced specialists, and takes time. AI could help both speed up the process, and prioritise the patients who need review and treatment the earliest.

Moorfields is now sharing 1 million fundus photographs and images with DeepMind, who will train its AI algorithms to detect even the earliest signs of disease pathology.



nature medicine ARTICLES

Clinically applicable deep learning for diagnosis and referral in retinal disease

Jeffrey De Fauw[1], Joseph R. Ledsam[1], Bernardino Romera-Paredes[1], Stanislav Nikolov[1], Nenad Tomasev[1], Sam Blackwell[1], Harry Askham[1], Xavier Glorot[1], Brendan O'Donoghue[1], Daniel Visentin[1], George van den Driessche[1], Balaji Lakshminarayanan[1], Clemens Meyer[1], Faith Mackinder[1], Simon Bouton[1], Kareem Ayoub[1], Reena Chopra[2], Dominic King[1], Alan Karthikesalingam[1], Cían O. Hughes[1,3], Rosalind Raine[3], Julian Hughes[3], Dawn A. Sim[2], Catherine Egan[2], Adnan Tufail[2], Hugh Montgomery[3], Demis Hassabis[1], Geraint Rees[3], Trevor Back[1], Peng T. Khaw[2], Mustafa Suleyman[1], Julien Cornebise[1,3,4], Pearse A. Keane[2,4]* and Olaf Ronneberger[1,4]*

The volume and complexity of diagnostic imaging is increasing at a pace faster than the availability of human expertise to interpret it. Artificial intelligence has shown great promise in classifying two-dimensional photographs of some common diseases and typically relies on databases of millions of annotated images. Until now, the challenge of reaching the performance of expert clinicians in a real-world clinical pathway with three-dimensional diagnostic scans has remained unsolved. Here, we apply a novel deep learning architecture to a clinically heterogeneous set of three-dimensional optical coherence tomography scans from patients referred to a major eye hospital. We demonstrate performance in making a referral recommendation that reaches or exceeds that of experts on a range of sight-threatening retinal diseases after training on only 14,884 scans. Moreover, we demonstrate that the tissue segmentations produced by our architecture act as a device-independent representation; referral accuracy is maintained when using tissue segmentations from a different type of device. Our work removes previous barriers to wider clinical use without prohibitive training data requirements across multiple pathologies in a real-world setting.

Medical imaging is expanding globally at an unprecedented rate[1–3], leading to an ever-expanding quantity of data that requires human expertise and judgement to interpret and triage. In many clinical specialities there is a relative shortage of this expertise to provide timely diagnosis and referral. For example, in ophthalmology, the widespread availability of optical coherence tomography (OCT) has shown promise in resolving some of these criteria in isolation, but has not yet shown clinical applicability by resolving all three.

Results

Clinical application and AI architecture. We developed our architecture in the challenging context of OCT imaging for oph-

IBM Alpha Zone Programme - Support for a new Israeli health accelerator programme

A new health accelerator programme – the UK Israel Dangoor Health Initiative Accelerator (part of the IBM Alpha Zone Programme) will help Israeli based startups to reach new markets and grow their business based on IBM technologies.

DigitalHealth.London, which specialises in matching innovators with NHS need and supporting them to navigate the UK health environment, will play a key role in delivering the initiative.

DigitalHealth.London will provide mentorship and guidance on the NHS, its operations and market penetration.

Sleepio – working with researchers to gather evidence

- Digital sleep improvement programme (available via web and mobile), to help overcome poor sleep

- Uses the latest digital technology to deliver the ingredients of CBT for insomnia in a fully automated, scalable, yet personalised way

- Received support from the NHS Innovation Accelerator

- Largest ever RCT, funded by Wellcome and conducted by the University of Oxford, evidenced that treating insomnia with online cognitive behavioural therapy (CBT) could reduce mental health problems such as anxiety, depression, and paranoia

RespiraSense – working with the NHS to conduct real world testing

- A device that enables continuous monitoring of respiratory rate to more quickly spot the signs of patient deterioration
- An NHS Innovation Accelerator innovation
- Working with NHS trusts in UCLPartners geography to test the innovation and using findings to evaluate impact in a real-world context and understand the kinds of adaptations that need to be made to ensure its effectiveness

Digital platforms to allow people to understand and engage in research

>37,000 Volunteers

>10,500 Volunteers Enrolled in Dementia Studies

> 81 active research studies

Working with research

UCLPartners IQVIA Prime site

In 2013 UCLPartners partnered with IQVIA, the world's biggest clinical research organisation, to become a Prime site.

Prime Sites receive first notification of all IQVIA trials that will be based in Europe and the company provides considerable infrastructure contributions that support study initiation and recruitment and a commercial management input.

Our IQVIA Prime site has been one of the top commercial recruiting sites into clinical trials in the UK, working across many of our NHS partner trusts.

IQVIA is now spreading this model and is set to invest £24 million in a Prime site in the north of England.

A pilot study is to be conducted looking at real world evidence data to improve trial capability and patient outcomes.

Future opportunities

- Create more comprehensive and systematic platforms to support innovation and improvement
- Better use of actionable data
- Enhance our recruitment of patients into research studies
- Forge strong strategic partnerships with industry and academic partners
- Support delivery of digital innovation hubs