

digitalhealth

REWired

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Headline Sponsors:



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Digital Productivity programme - XR Lead
NHS England

Extended Reality technologies in the NHS

NHS England Transformation Directorate – Digital Productivity programme

Neesa Mangalaparathy (XR programme delivery lead)

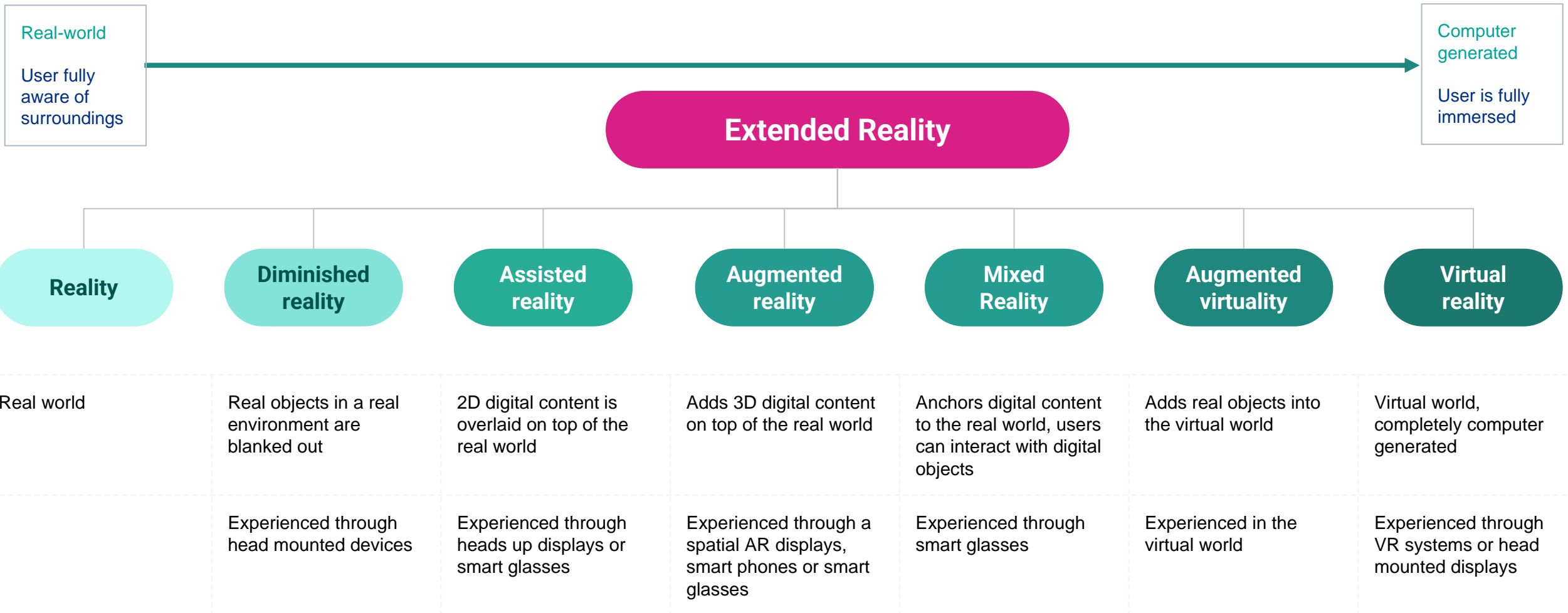
14 March 2023



What is extended realities (XR)?



Extended realities refers to a spectrum of technologies combining various blends of real and virtual environments

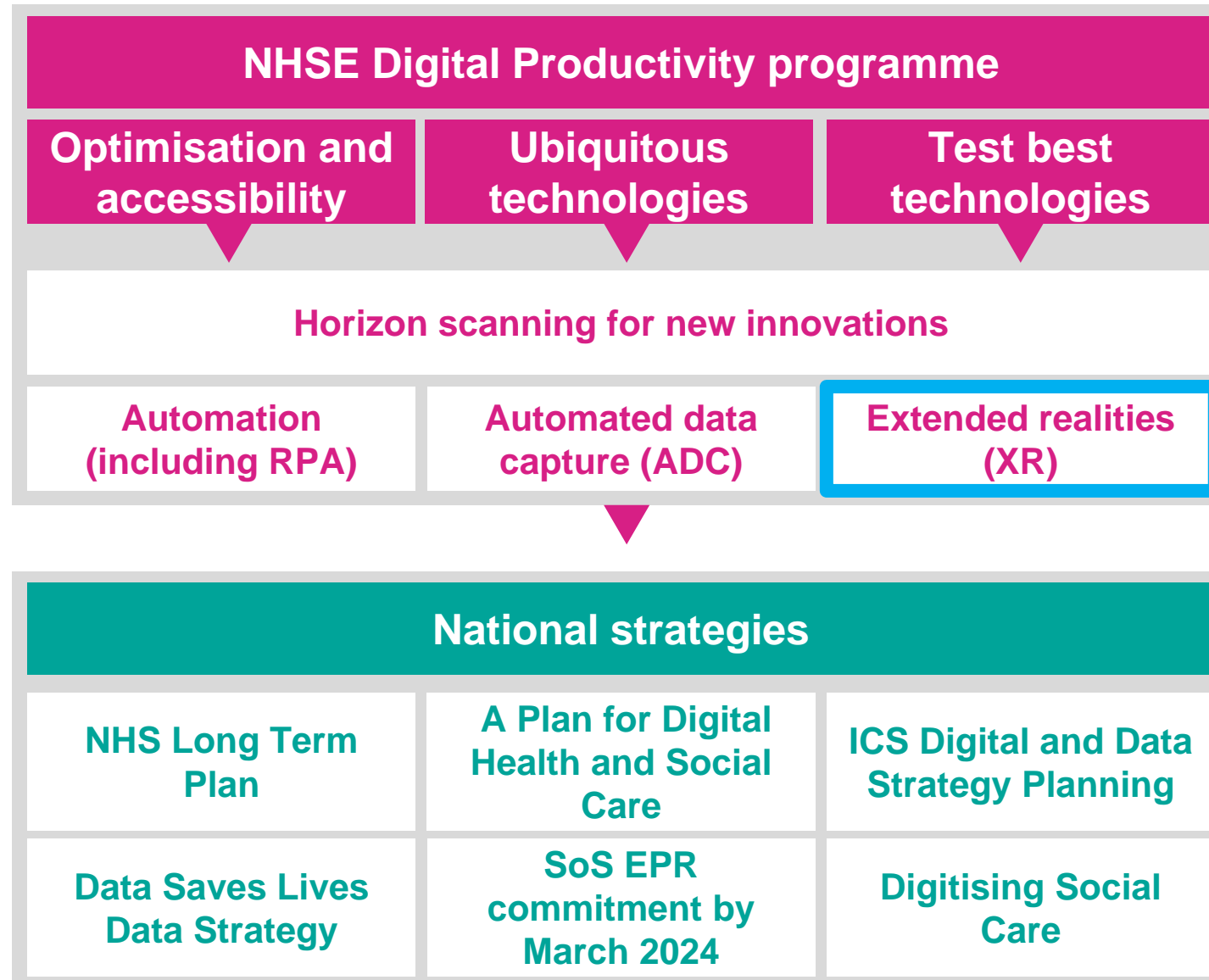


The national context

Our work on Extended Realities forms part of the Digital Productivity programme of works – now in its third year of delivery.

The programme aims to **accelerate the adoption of evidence-based digital tools by enabling scale and spread system-wide** to:

- improve productivity across the NHS and deliver care and treatments to more patients
- improve the quality of care
- save time, lower costs, reduce waste
- reduce burden on the workforce
- increase patient and staff satisfaction




XR programme overview



Aim

To explore opportunities for XR in healthcare; mobilise SME networks to grow and develop communities of practice; and generate evidence to inform strategy

Benefits



Improve efficiency of services



Increase accessibility

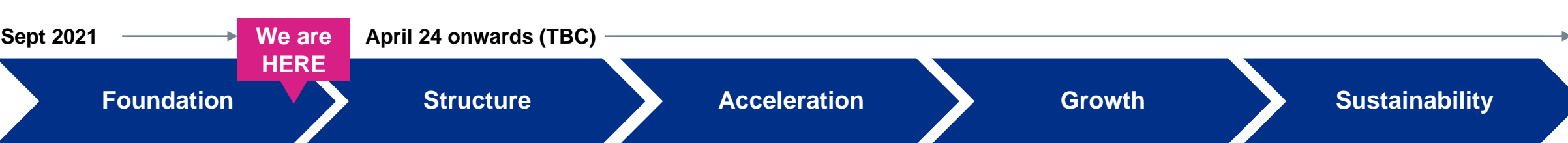


Improve patient and staff experience

2022/23 plan

- Leverage the NHS as a platform for rapid research and innovation for XR to ensure we are human centred, clinically driven, and evidence based
- Mobilise, connect and leverage expert XR knowledge
- Manage & maintain NHS Futures community of practice
- Host an XR product directory to support procurement
- Identify and back the most impactful opportunities that can improve our health and care system, and scale this quickly
- Provide support to NHS orgs & suppliers
- Manage & maintain XR UTF reporting
- Support delivery of quality and evidence-based operational performance improvement
- Establish the infrastructure needed to enable safe, trusted and effective adoption of XR, now and as it evolves

Roadmap



Whole ecosystem collaboration



Digital health innovators

Leveraging existing internal and external networks and digital transformation leads to guide our work, seeking input and insights to support adoption and maximise benefit across the health and care system.

National (Gov / NHS)

Collaborating on a clearer route to market for XR products with commercial teams and HEE. Developing a proposal for research on XR and testing through the AAC. Working with across national teams to create new content and support adoption across the NHS.

Users / Patients

Working together to develop benefits management tools based on our programme tools to support the NHS finance community.

International

Collaborating with international governments to promote our work in XR in the NHS, but also to share learnings and work together on global challenges associated with XR.

Extended reality ecosystem in healthcare

Working with suppliers and vendors – like today - to co-produce content to inform strategy and support offers across the XR in health care ecosystem.

Suppliers & vendors

Working with local and regional networks (such as ICSs/ICBs, local authorities etc) to gauge appetite and activity, obtain insights to inform strategy, and to provide centralised support through good practice guidance, communities of practice and regular engagement.

Regional & Local

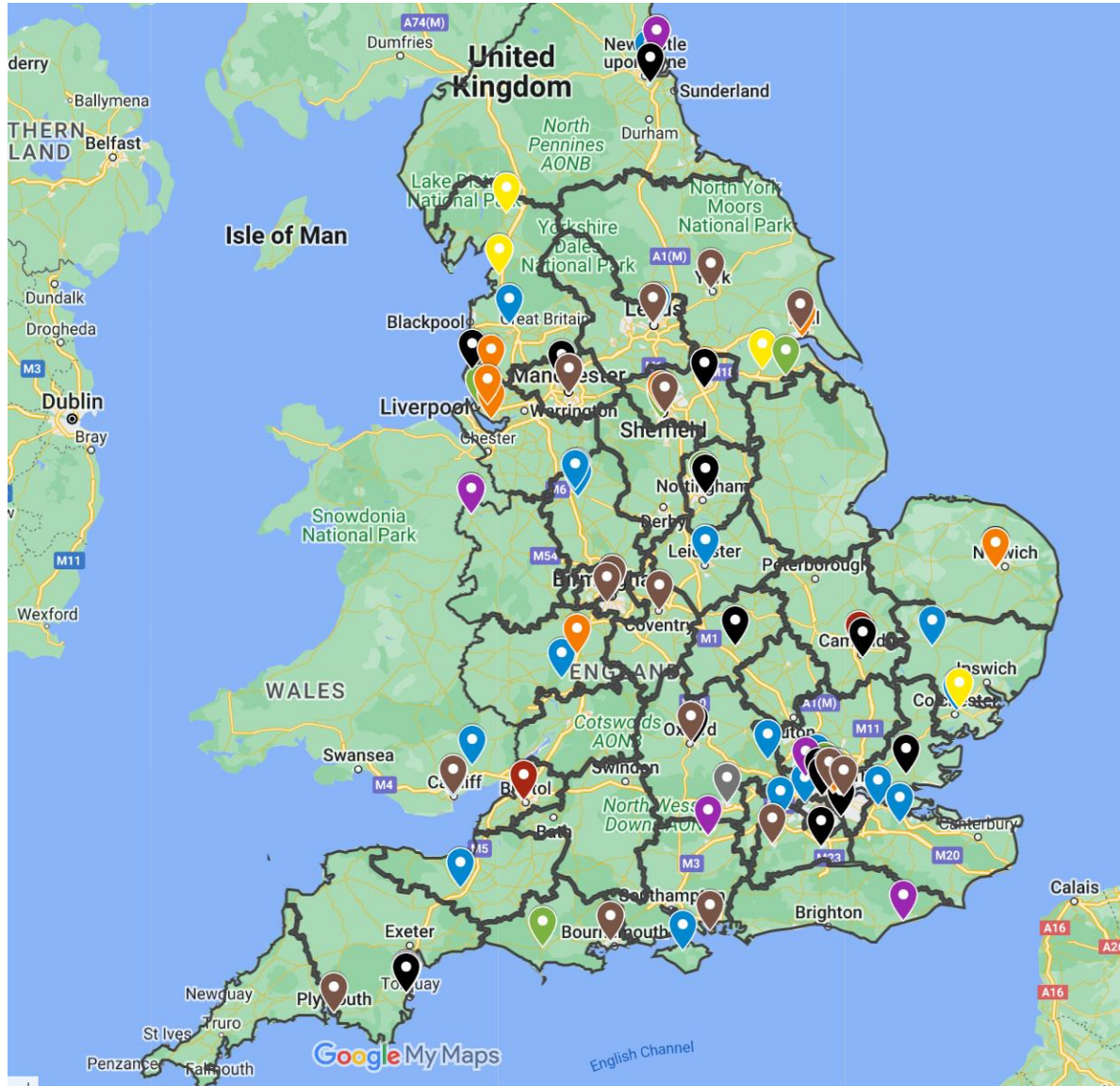
Collaborating with think tanks and subject matter experts to ensure input and insights from their network, and promote awareness of good practice.

Think tanks / experts

Working with Research Institutes, university research centres and student groups to align research areas with NHS strategic priorities, evaluation, and share best practice.

Research / Academia

A snapshot of NHS activity



XR spans multiple applications, across all care settings.

Pin colour	Application
Blue	Clinical skills and education
Dark red	Data analysis
Yellow	Remote connections
Green	Physiotherapy and rehab
Purple	Pain management / distraction
Black	Mental health and wellbeing
Orange	Patient education
Grey	Image guided surgery
Brown	Research (variable)

Source: XR in Healthcare Map of Use Cases

Case studies

North Lincolnshire

North Lincolnshire have offered lung patients access to a pioneering virtual reality (VR) pulmonary rehabilitation programme.

Evaluation from the pilot scheme showed that patient retention rates improved by up to 80 per cent – boosting patients' independence and reducing the need for hospital visits

A clinician from the CCG states **'this is an additional service which will add significant capacity to deliver pulmonary rehabilitation for North Lincolnshire residents. We anticipate this will reduce waiting times and ultimately reduce the number of hospital admissions for people living with COPD'**

North Lincolnshire lung patients first in UK to be offered 'virtual rehab'



Lung patients in North Lincolnshire have become the first in the UK to benefit from a pioneering virtual reality (VR) pulmonary rehabilitation programme offered for the first time on the NHS.

GP practices in the region are offering patients living with chronic obstructive pulmonary disorder (COPD) a kit consisting of a VR headset, wearable sensor and mobile data hotspot so they can partake in rehab exercises from the comfort of their own home.

The immersive app places the wearer in a beachside environment, with training led by digital instructor.

NHS North Lincolnshire Clinical Commissioning Group (CCG) successfully submitted a bid to NHS England to fund the programme for people in North Lincolnshire living with COPD in late 2019.

The new service, delivered across the three Primary Care Networks in North Lincolnshire, is expected to provide an additional 501 pulmonary rehabilitation places a year.

Case studies

Torbay and South Devon NHS Foundation Trust

Torbay and South Devon NHS Foundation Trust's Digital Futures programme allows staff to be exposed to digital technology and empowers them to develop their own digital solutions within patient pathways, to improve patient experience and support health outcomes.

So far this includes the **use of mixed reality headsets for remote consultation for breast wound care, and virtual reality to distract from pain or anxiety in toenail removal surgery, saving £40,000 a year.**

The program is also developing digital solutions in adolescent mental health and intensive care rehabilitation pathways and remote multiple sclerosis consultations.

You can access the Torbay blueprint on a page here: [Extended Reality Solutions for Healthcare - Blueprint on a page - Blueprinting - FutureNHS Collaboration Platform](#)

Torbay and South Devon NHS Foundation Trust



Extended Reality Solutions for Healthcare

Project Summary

The Trust's Digital Futures Lab has been on a seven-year journey in Extended Reality (XR). Our mission is to inform other Trusts and help them overcome adoption challenges, scale up, build productive relationships that excite and encourage clinical digital champions, develop empowered experiences for patients, and evaluate the impact and benefits.

The Challenge

- Finding solutions for improving staff productivity and reducing COVID backlogs
- Reducing the number of follow up appointments and patient travel times
- Providing remote advice and improving community outreach
- Improving soft skills/medical humanities-based education to teach the importance of non-technical skills and their implication on quality of care, patient compliance and outcomes
- Helping healthcare workers manage their mental well-being and understand the role of mindfulness
- Helping patients manage their pain/anxiety/stress through technological tools for distraction

The Solution

The Trust procured virtual and augmented reality headsets:

- **MS HoloLens** for remote consulting
 - In breast wound care, allowing nurses to connect with consultants remotely to assess Multiple Sclerosis (MS) patients, connecting neuro consultants to community and nurses in patients' homes
- **Oculus Quests** for:
 - Pain, anxiety, and stress Virtual Reality (VR) distraction in podiatry
 - Mental well-being experiences for staff
 - Empathy training skills for students, gamified VR for teaching communication

Costs & Resources

The Trust has several headsets but generally uses standalone devices and UVC cleaning boxes to maintain hygiene:

- Oculus Quest 12 * £300 = £3,600
- Microsoft HoloLens 7 * £3200= £22,400
- HoloLens Remote Assist Licence 7 * £500 = £3,500
- UVC Clean box 2 * £2,200= £4,400
- Uvisan Cleanbox = £3,800

Benefits

- HoloLens remote consultation for breast wound care and patients with MS saves nurse and consultant time, reduces follow up appointments, reduces travel for patients, empowers patients and improves overall patient experience.
- HoloLens remote advice (Podiatrists treating diabetic foot ulcers) support improves information guidance for complex cases, reducing repeat visits and escalation.
- VR distraction for pain/anxiety in toe-nail removal surgery leads to annual savings of £40,000.
- Anticipated cash-releasing benefits will be confirmed after HoloLens pilots for remote consulting are completed by the September 2022.

About the Trust

Torbay and South Devon NHS Foundation Trust is an Integrated Care Organisation (ICO) providing acute health care services from Torbay Hospital, community health services and adult social care. Along with Torbay Hospital, the Trust runs five community hospitals, from Dawlish to Brixham. Annually, the Trust has around 500,000 face-to-face contacts with patients within their homes and communities, and over 78,000 attendances in A&E. The Trust serves a resident population of 286,000, plus 100,000 visitors during the summer.

Testimonial

"I would like to thank you and the team for your tremendous help with our virtual reality project. It will make a huge difference to our orthopaedic patients."

"Without your support, we would not be able to progress with some of our projects."

Bozena Lassota-Korba
Consultant Anesthetics and Human Factors
Yeovil District Hospital

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The full Blueprint is expected to be on FutureNHS soon.

For access please email: blueprinting@nhsx.nhs.uk

Case studies



Sheffield Hallam University, Sheffield Children's NHS Foundation Trust and Leeds Teaching NHS Trust

A team of researchers and clinicians in Sheffield are developing VR games for lower-limb rehabilitation in children with Duchenne muscular dystrophy (DMD).

“By advancing the way in which physiotherapy can be delivered using virtual reality, we ensure that children with DMD engage with and enjoy their therapy at home and in hospital whilst improving their future quality of life.” – consultant at Sheffield Children's Hospital

The research team has previously developed and deployed immersive VR scenarios to aid the physiotherapy and rehabilitation of adult amputees, burns patients and children with upper and lower limb injuries.

Immersive virtual reality project launches to help children diagnosed with rare muscle-wasting disease

[Home](#) | [News](#) | Immersive virtual reality project launches to help children diagnosed with rare muscle-wasting disease



📅 05 August 2021

A team of researchers and clinicians from Sheffield Hallam University, Sheffield Children's NHS Foundation Trust and Leeds Teaching NHS Trust is developing an immersive virtual reality (VR) platform to improve the physiotherapy of children living with Duchenne muscular dystrophy (DMD).

DMD is a paediatric genetic disease that causes muscles to deteriorate and break down. It affects 2,500 children in the UK and there is currently no cure.

Children with DMD are encouraged to undertake a daily stretching programme for maximum muscle extensibility, however it can be difficult to maintain engagement and this can lead to complications, reduced function and a poorer long-term prognosis.

Contact Us

In an emergency
call 999

For non-urgent medical advice
call 111

[Visit our Emergency Department](#)

To speak to our switchboard
call 0114 271 7000

To change an appointment
call 0114 305 3691

Our XR transformation journey



XR programme launched to define system needs, deliver tactical solutions and generate evidence



Over 100 stakeholders engaged to identify potential application areas for XR



Commissioned a **discovery on XR** to gain a better understanding of its capabilities in healthcare



Developed a product directory and case study database with **Power BI XR Evidence Data Visualisation tool** to support NHS providers seeking XR solutions



Built a benefits, risks and costs framework to **standardise evaluation of XR projects**



XR Discovery Report launched, with recommendations for ensuring safety; evaluating benefits; and scaling deployment



National XR Community of Practice now has **250+ active members**

2021

2022

2023+

National XR Community of Practice created to encourage sharing of knowledge and best practice



Awarded 14 sites with £2 million from the **Unified Tech Fund** to pilot XR and generate evidence and learnings



250+ case studies and academic papers analysed



Identified a **clear route to market** for XR in education and training to be taken forward with Health Education England



Our 2023 goals are to:

- **Generate evidence** through our pilot sites and collaboration with the XR in healthcare ecosystem
- **Optimise** productivity realisation of XR via evidence based tools and resources



Key findings (so far)



Most commonly associated benefits

- Saving staff time
- Improving efficiency of services
- Improving staff experience
- Increasing accessibility
- Improved patient experience
- Increased positive patient outcomes

These align with key commitments outlined in the [NHS 2022-23 business plan](#) (delivering more elective care, improving mental health services, improving productivity across the system)

Most common application areas in the NHS

1. Education and training (staff and patients)
2. Mental health and well being
3. Physiotherapy and rehabilitation
4. Pain management

Emerging application areas

- Remote connections
- 3D data visualisation
- Image-guided surgery

Most commonly mentioned barriers

- Lack of evidence of impact
- High initial costs
- Absence of a clear route to market
- Lack of clarity on regulatory requirements
- Usability and accessibility issues for specific user groups
- Lack of content for some applications

Commonly shared factors for success

- Infrastructure for XR within the organisation
- Blended model of care - when deploying for a specific use case, a key criterion for success is to map out the patient's journey to understand the various touchpoints and when XR fits in
- Providing evidence for long-term positive patient outcomes through research

Generating real world evidence



Nottingham University Hospitals
NHS Trust



Royal Free London
NHS Foundation Trust



Buckinghamshire Healthcare
NHS Trust



The Leeds
Teaching Hospitals
NHS Trust



Cambridge
University Hospitals
NHS Foundation Trust



North West
Ambulance Service
NHS Trust



South London
and Maudsley
NHS Foundation Trust



University Hospitals of
Morecambe Bay
NHS Foundation Trust



Hull University
Teaching Hospitals
NHS Trust



Rotherham Doncaster
and South Humber
NHS Foundation Trust



Nottinghamshire Healthcare
NHS Foundation Trust



Central and
North West London
NHS Foundation Trust



Guy's and St Thomas'
NHS Foundation Trust

We have invested £2m to support 14 organisations to use XR technology such as assisted reality, virtual reality, augmented reality and mixed reality.

These organisations include acute trusts, ambulance trusts and community services using XR across the following application areas:

- patient education
- health professional education and training
- mental health and wellbeing
- pain distraction
- clinical communication
- physiotherapy and rehabilitation
- image guided surgery.

Some of the benefits we are measuring include **reduced costs** as a result of treating patients in different ways, **improved patient satisfaction**, **increased access to care** for patients and **increased productivity** as a result of reducing length of stay and improving patient outcomes more quickly.

- Is it safe?
- Is it effective?
- What is the ROI?
- Implementation learnings

XR community of practice

A dedicated space for people interested in helping to build a world-class ecosystem for XR in the NHS and social care

Guidance

- Technology reports
- Designing XR considerations
- Deploying XR – product directory, templates, etc
- Benefits and evaluation support

Best Practice

- Case studies
- Blueprints
- Patient stories
- Map of use cases
- Evidence search tool
- Discussion forum
- Example documents from sites (e.g. DPIA)

Support network

- Discussion forum
- Direct messaging
- Opportunities and events
- Access to the XR in healthcare ecosystem

The screenshot shows the FutureNHS workspace for 'Extended Reality (XR) in Healthcare'. The interface includes a search bar, a 'Create a new item' button, and a 'Support' button. A central text block welcomes users to the workspace, explaining its purpose as a dedicated space for building a world-class ecosystem for XR in the NHS and social care. Below the text is a grid of resource buttons: 'About XR', 'XR Discovery Report', 'Examples of XR use', 'Useful links', 'Getting Started', 'Deploying XR', 'Evaluating the impact of XR', 'Search for Evidence', 'Designing XR', 'Buying and selling XR', 'XR Product Directory', 'Funding opportunities', and 'NHS funded projects (UTF)'. At the bottom, there is a map titled 'XR Use Cases' showing various locations across the UK and Europe, with a call to action to get in touch and a link to download the map data.

Further information



Reach out to us if you have questions or would like advice - england.digital.productivity@nhs.net



**Join our National Community of Practice –
Extended Reality in Healthcare**
<https://future.nhs.uk/NationalXRHealthcare>



Find out more about our work - <https://transform.england.nhs.uk/key-tools-and-info/digital-productivity/>

