

ConnectXR

A toolkit for new
innovation pathways
for immersive in
health and
community
organisations



Piloted in partnership with the Royal Borough of Windsor and Maidenhead in Maidenhead Library

NFTS

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**INDUSTRIAL
STRATEGY**



StoryFutures

National Centre for Immersive Storytelling

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Executive Summary

Executive Summary

ConnectXR is a StoryFutures innovation programme, which designed and tested a new innovation pathway for creative enterprises to create XR in health and wellbeing solutions from development to implementation. The programme was designed as a pilot to meet the ambitions of XR creative enterprises, creating health and wellbeing solutions, to establish new routes to audiences through distribution with community assets, in this case libraries.

StoryFutures' StoryTrails project and subsequent partnerships with Meta and the BFI, resulted in ongoing collaborations with 17 libraries and 7 arts hubs and cinema venues in the UK, demonstrating that libraries and cinemas can play a key role in the successful engagement of communities in XR experiences.

ConnectXR explored the challenges and opportunities facing creative XR enterprises when navigating the essential and complex network of health and community stakeholders needed to support the delivery of XR in health solutions in libraries.

While creative companies are adept at creating engaging experiences, the direction and input from health services remain essential. This is where the innovation pipeline at the heart of Connect XR plays a critical role in bringing together the creative spark of these companies with the practical, health-focused insights of healthcare professionals.

Audience data is ordinarily hard to access yet critical in building the health economics needed to attract funding and support. Through an open competition, "Soul Paint", a VR application exploring physical and emotional wellbeing by the creative UK SME Hatsumi and its production partner Monobanda, was selected for a 2-week library pilot, during which audience research was conducted.

Findings demonstrated that Maidenhead Library, as a strong community hub, was an appropriate setting for this type of innovation. Users of a wide range of ages and technical ability found it to be enjoyable, interesting and suitable. A large majority indicated they would repeat the experience and recommend it to others. There was a strong positive impact on wellbeing, through the opportunity to take time for reflection and to connect with others. Older users found the opportunity to try something new to be enriching and valuable.

The pilot demonstrated that establishing a shared innovation pipeline is essential and effective in ensuring the development of high quality XR in health solutions, and that the involvement of the right stakeholders is not only critical to community deployment, but ensures delivery is aligned with local healthcare needs.

Our lessons learned span the importance of networking, training, relationship building, engagement with communities, strong host support and careful planning of the audience journey.

Connect XR broke new ground in building the key relationships needed for successful deployment of XR in health solutions within community assets. But more needs to be done to further test and explore this model to ensure it is a viable and sustainable route for Creative XR SMEs to innovate and reach new audiences. The opportunity exists, building on the new momentum within local authorities and integrated care boards, to think creatively about the future role of libraries and XR in health experiences. Greater collaboration between these new partnerships, social prescribing teams and Creative XR SMEs themselves, can generate new and valuable routes of ensuring better health outcomes for all, experienced at the heart of local communities themselves.

Overall Project Highlights

The library is the place to be!

- Participants unanimously found the library a useful place for this kind of activity
- Library staff were 100% in support of hosting temporary or permanent XR activities like Soul Paint after the pilot

Seizing the appeal of immersive

- Soul Paint appealed to a diverse audience, representing a range of ages, ethnicities and genders
- Only 27% indicated they had tried VR previously; 78% said they would do the experience again
- The library as a community centre provided opportunity to try something new for many

Positive impact on wellbeing

- A comparison of participants' feelings before and after the Soul Paint experience showed a 22% increase in positive feelings
- This effect was more pronounced for younger people – 61% felt negative or neutral before the experience and **76% felt positive** after the experience: a 95% increase in positive feelings

Benefit to creative companies

- Hatsumi/Monobanda's Soul Paint was officially selected to premiere at SXSW in March 2024 taking home the XR Experience Special Jury Award
- The team are now exploring other applications including as a home-based spatial journaling tool, a global touring experience, an educational/workplace wellbeing tool, and an application to support new forms of patient-doctor connection and therapeutic interventions

Putting research into action

Impact of the research included:

- Establishment of innovative partnership and network
- Improvement of competencies and abilities within library teams and social prescribers network through training
- Demonstrated scalability to other contexts

Knowledge exchange

- The pilot and sandpit sessions effectively allowed stakeholders to exchange information
- The network grew giving rise to a spin off pilot at South Devon College in partnership with Torbay and South Devon NHS Foundation Trust
- All staff completed Mental Health First Aid training to support the pilot

Introduction

What is ConnectXR?

Overview

ConnectXR is a StoryFutures R&D programme, which designed and tested a new innovation pipeline. This pipeline is tailored for creative enterprises focused on developing Extended Reality (XR) solutions aimed at enhancing health and wellbeing.

The pilot ran from July 2023 to January 2024 in collaboration with the Department of Health at Royal Holloway, University of London, The Royal Borough of Windsor and Maidenhead Council, Frimley Integrated Care Board, Maidenhead Social Prescribing Team and Maidenhead Library.

An open competition in May 2023 saw Hatsumi, a UK Creative XR SME, secure funding to further develop a XR solution called Soul Paint which was demonstrated over a 2-week period in a library setting. This was extended to a second setting, Torbay and Devon NHS Trust, for further research.

ConnectXR also tested Soul Paint in a live community setting, a local library to specifically explore how XR experiences can leverage the potential of libraries to promote better health and wellbeing outcomes within communities.

The emphasis of ConnectXR was on involving the relevant stakeholders required for successful implementation of a health XR application in a pilot, in order to test assumptions, incorporate varied expertise, and encourage insights from multiple vantage points.

This was achieved through the creation of a new Innovation Pipeline which enabled greater participation and collaboration between the critical stakeholders essential to development, implementation and ultimately deployment in a local community setting, Maidenhead Library.

Goals

Test a health and wellbeing innovation pipeline, which uses story and XR (VR, MR, AR) to improve quality of life, health and wellbeing

Work locally with users to trial whether an immersive experience that seems to improve connection to self, community, and place may help address social or health issues and stigmas that are generating a sense of disempowerment or isolation

Collaborate with a library to provide ease of access to interventions, engaging with social prescribing models to bring health and wellbeing support outside of the clinic and into the community.

Explore the role of social prescribing in engaging the community in XR in health and wellbeing solutions and where this can be scaled up in the future.

Our Community and Health Partnership

In ConnectXR, strong partner collaborations enabled the implementation of Virtual Reality (VR) within a library space.

The Royal Borough of Windsor and Maidenhead (RBWM) was approached for their strategic focus to reduce loneliness within the community, capitalising their libraries as strong community hubs. Maidenhead Library was proposed for the community setting as this represented a large community space that is successful in drawing in the community for diverse functions including council services. The library is also served by a cafe further bringing people together in a social capacity. It also serves as a warm space accessible to all with access to Wi-Fi and internet via PC stations.

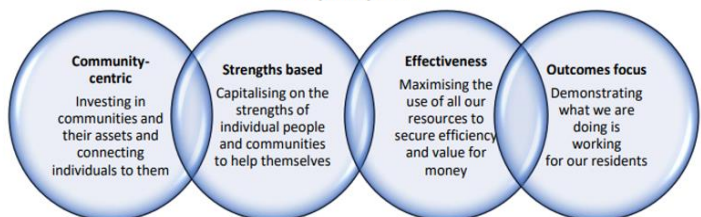
Therefore, this is a busy library serving the whole community of different ages and background in a common space. Doing a VR pilot expanded the portfolio of activities of the library and was able to reach the community in a different and innovative way.

This pilot resonated with the RBWM Health and Wellbeing strategy cementing the partnership.



NHS
East Berkshire
 Clinical Commissioning Group
Health and Wellbeing Strategy 2021-25

We recognise that our vision can only be achieved by partners **working together** across the borough, with residents and our diverse communities. Our partnership will be driven by our **core principles**:



Our Production Partner

What is Soul Paint?

In order for ConnectXR to focus on the innovation pipeline research, a well-developed XR project was selected through an open competition. Soul Paint is a bodymapping application that guides users to connect with their physical and emotional sensations, and represents these in a 3D image of their own body via painting tools. It centres on an art-based approach to exploring personal wellbeing.

Soul Paint is a co-production between Hatsumi and Monobanda and was funded by the Netherlands Film Funds, Creative Industries NL, Unity for Humanity, StoryFutures ConnectXR programme, and CreativeXR.



The ConnectXR pilot presented a work in progress version of Soul Paint. Thus, feedback could be gathered for the Hatsumi and Monobanda team to understand what audiences found helpful, what development they suggested and the overall suitability of the experience for this application.

The Hatsumi/Monobanda team were able to take advantage of the pilot to gather additional research and further develop and iterate the experience as a result of this project, but significant development had taken place before the pilot, including various rounds of testing. ConnectXR, therefore, did not involve a full co-design process, but as the [Toolkit section](#) of this report will note, new projects may benefit from co-design in collaboration with stakeholders from the outset.

More information about Soul Paint is available at <https://www.soulpaint.co/> or on their Instagram account: www.instagram.com/soulpaint.co/.

A [trailer](#) and [interviews](#) about the experience are also available.



Why XR, Creativity and Health?

In a scoping review for the World Health Organization, Fancourt and Finn (2019) found that arts have the potential to be deployed in two main areas of health and wellbeing:

- 1) health promotion and prevention of ill health;
- 2) management and treatment of health.

Some benefits of arts-based approaches include promoting healthy behaviours, preventing ill mental health, supporting caregiving and treating mental health issues.

However, despite the growing evidence of these benefits, lack of awareness perpetuates a lack of uptake of arts approaches to health within policy (Fancourt and Finn, 2019).

To address this, the WHO report recommended:

- that culturally diverse forms of art be made available and accessible to a range of different groups across the life-course, especially for those that experience health inequalities;
- that art and cultural organisations be encouraged to make health and wellbeing a priority
- that efforts be made to improve public awareness of the benefits of art to health and wellbeing and develop interventions to support healthy behaviours and promote healthy lifestyles.



Illustrations: ConnectXR Sandpit discussion, 16 January 2024, documented by LiveIllustration.co.uk

Art has been significantly associated with healthy ageing and improved mental health in adults (Sajjani and Fietje, 2023). The art technique used by Soul Paint, bodymapping, was developed to enable the artistic expression of anxiety by drawing on one's body image on paper (Vaughan et al, 2023). This form of art draws on a concept of mindfulness with the benefits of grounding one's thoughts and feelings.

In the case of ConnectXR the chosen VR experience Soul Paint uses this creative activity within an immersive space to lead users through a guided process, presenting an avatar that they can in turn observe, inhabit, and interact with to enhance their awareness of their own physical and emotional sensations. The immersive medium thus presents a unique, experiential opportunity for adults to consider and reflect on their wellbeing and express themselves via virtual reality art.

The Innovation Pipeline

Overview

The ConnectXR Innovation Pipeline is a designed process aimed at developing and bringing together new XR technologies into the areas of health and wellbeing. This approach is a collaborative effort that combines the imaginative strength of the arts, the thoughtful planning from academic fields, knowledge of needs from local authority and the hands-on experience of local health professionals.

The pipeline's primary aim within the ConnectXR programme is to test and demonstrate a practical innovation model others can follow.

Through local trials with community users, the project's aim is to assess the impact of immersive XR experiences in addressing social and health-related challenges, particularly those contributing to feelings of isolation and wellbeing.

The pipeline progresses through key stages, beginning with building networks and defining everyone's role in a 'knowledge transfer' phase. This early stage is vital for working across different areas of expertise and creating a common understanding among all the groups involved.

At the Programme and Research Design stage important objectives are set and the research and needs of all the partners are taken into account.

The pipeline then advances through to trialling the technology with users, making sure at each step to assess the impact, and make improvements based on feedback from both those using the system (the end users) and from key stakeholders.

The final stages involve evaluations and reportage of results to ground the process for future scaling and financial viability for wider use.

It is important to acknowledge the pipeline is acting as a bridge for collaboration between the arts and health sectors joining of the creative industry, academia, and healthcare. Each of these fields brings its own unique vocabulary, perspectives, and methodologies.

In designing and testing this new model we've strived to merge distinct viewpoints into a cohesive narrative not just within this report but in our approach to the project.

However, it is possible that certain terms and phrases may resonate more strongly with one discipline over the others. Our goal has been to bridge these linguistic divides, aiming for a common language that connects and is accessible to all stakeholders involved to understand.

The Connect XR Innovation Pipeline

METHOD & PROCESS: Impact embedded at each stage (6mths July '23 - Jan '24)



Key Elements of the Pipeline

01

1. Collaborative Foundations

A key concept behind the ConnectXR pipeline is that it should initiate with a process that identifies and brings together a diverse mix of partners and stakeholders.

Assembling a team of health and technology industry experts, academic expertise and running 'sandpit style' workshops laid the foundation on which to bring together the final partners and stakeholders.

In the case of ConnectXR this collective included StoryFutures, the SME Hatsumi, RBWM health and local authority sector representatives, social prescribing teams, and Maidenhead Public Library services.

The selected SME, Hatsumi, had previous experience of XR applications in healthcare, however in future iterations the pipeline stakeholders may differ according to local needs. It would also be helpful to consider how to work with SMEs that have less experience and understanding in the space. Particularly around key applications, measuring outcomes, and how XR could fit into healthcare contexts.

02

03

04

2. Demonstration and Real-world Application

The demonstration stage placed the refined XR prototype into the hands of the audiences within a community setting, primarily on this project through a 2-week placement at Maidenhead Library. This real-world testing was pivotal in assessing the practical application of the XR solution and its ability to resonate with the audience, providing an understanding of how it worked and any changes

05

06

With insights garnered from this stage ongoing feedback from audience trials was incorporated at various stages back into the pipeline process and in to refining the prototype to align closely with the project's objectives and the users' needs.

Key Elements of the Pipeline (continued)

07

08

09

3. Knowledge Exchange and Economic Consideration

Throughout the innovation pipeline, there was a significant focus on knowledge exchange. This ongoing process ensured that learning was not siloed but shared across all levels of the project. An economic guide was embedded throughout the pipeline to record and consider the scalability and sustainability of the project outcomes. Discussions and knowledge exchange between the collaborators on the project helped to identify benefits from several perspectives and how these could be considered from an economic perspective, bringing reduced costs and helping stakeholders to achieve their targets. Benefits discussed included those experienced by individuals, stakeholders such as the library, and the broader health and social care system, and covered not just the potential for improved wellbeing but broader societal implications, e.g. through improved community engagement in mental health.

10

11

12

4. Dissemination and Future Application

In the final stages of the ConnectXR pipeline, the wealth of knowledge and experience accumulated with round table activities in a sandpit event that combined a Soul Paint experiential opportunity, panel discussions and interactive presentations. These have been distilled into this report. The report is designed, therefore, to act as a resource that can be used by others, serving not only as a record of the project's journey but also as a blueprint for future initiatives aiming to integrate XR technology within the health and wellbeing sectors.

Local stakeholder involvement from the start is key to helping to identify and defining the real challenges and needs of an innovation or service, and they are integral for changing the way health and wellbeing services are provided and experienced at both local and regional levels.

Local Authorities, ICBs, and regional stakeholders bring a comprehensive understanding of local healthcare needs, policies, and community dynamics. The pathways and processes in different ICBs may vary around the country, requiring attention to the specifics of each as a potential route to market. Given there is, as yet, no centralised system, app store or process for sharing and distributing health XR solutions, collaboration at the local and regional level is paramount. The insights of local stakeholders are essential in ensuring that innovative solutions like XR can be trialed and incorporated into existing health and care frameworks.

Audience Research

Background to the Research

The goal of ConnectXR was to develop and test a health and wellbeing innovation pipeline, and this included validating the XR product to measure its feasibility in this scenario and document its value to stakeholders – including the audience as end users. This was informed by our researchers' understanding of the evidence base and the research landscape as part of the applied research design, briefly summarised here.

VR in the health sector

There are broad applications of VR in the health sector. This spans various branches of health, like education and training (Lessick & Kraft, 2017), rehabilitation, cognitive and executive stimulation and interventions for mental health and wellbeing. These often are limited in the robustness and validity of the results (Page & Coxon, 2016). While VR technologies offer exciting possibilities in healthcare, there is a need for more research on the ethical considerations associated with their use. Studies often overlook aspects such as privacy (Adams et al, 2018), informed consent, and potential unintended consequences of VR interventions including adverse effects (Simon-Vicente et al, 2022), equity in access to immersive technologies (Zallio & Clarkson, 2022), and ensuring therapeutic boundaries.

Various digital initiatives to promote health and wellbeing have developed over the years, however immersive technology has been mostly piloted and targeted to specific groups.

The emergence of an integrated care model (NHS England, 2019a) shifts the focus from intervention to prevention, but also from targeting specific groups to a universal approach for wellbeing, aiming to address health inequalities and access.

Public Health is an approach used for promoting population health, preventing disease and enabling wellbeing (Fancourt & Finn, 2019) for all. VR in public health has focused on areas like improving situational awareness for health and safety (Zhu et al, 2024), however there is a paucity of research demonstrating community interventions for wellbeing rather than those that target a specific group of participants. Members of the public and all stakeholders should be included in the development phases to improve acceptance, sustainability, and impact (Wienert et al, 2022). Understanding the innovation pipeline is therefore critical to developing effective XR public health solutions.

“A digital public health intervention... should include members of the target group in the development process to improve social acceptance and achieve a population health impact.”

(Wienert et al, 2022)

Benefits of VR art for health

There are a number of studies (Yildirim & O’Grady, 2020; Finck et al, 2023) that have applied virtual reality to stress reduction and promoting mindfulness, aligning with the potential benefits of Soul Paint. Virtual reality art techniques, similar to those offered by Soul Paint, have been found to encourage emotional expression, emotional understanding and self-discovery (Hacmun, Regev and Salomon, 2018). A study on an interactive audiovisual abstract art experience (Jyska et al, 2022) finds evidence of anxiety reduction in participants. A comprehensive review finds that therapies incorporating music and visual art help people express experiences that are too difficult to put into words, allow them to make meaning of illnesses as part of their life story, provide respite, alleviate depression, and even significantly improve clinical outcomes (Stuckey & Nobel, 2010).

“Community leaders can partner with researchers to create a health care agenda that can have an impact on not only those who are ill in hospitals but those in the community who want to experience greater wellness.”

(Stuckey & Nobel 2010, 261)

Specifically, there is research (Dozio et al, 2022) examining how colour and sound in virtual reality environments can influence participant’s emotional states, supporting the design choices in the Soul Paint VR installation. Immersive virtual reality environments such as a cocoon-like setting can be used for emotional regulation and provide benefits for mental health management (Montana et al, 2020), and by achieving factors such as self-regulation, there can also be a transfer of knowledge from the experience (Makransky & Peterson, 2021).

The ConnectXR project has grounded its research within the community institution of Maidenhead Library to understand the acceptability and appeal of these types of benefits of VR in a community setting.



Social Prescribing

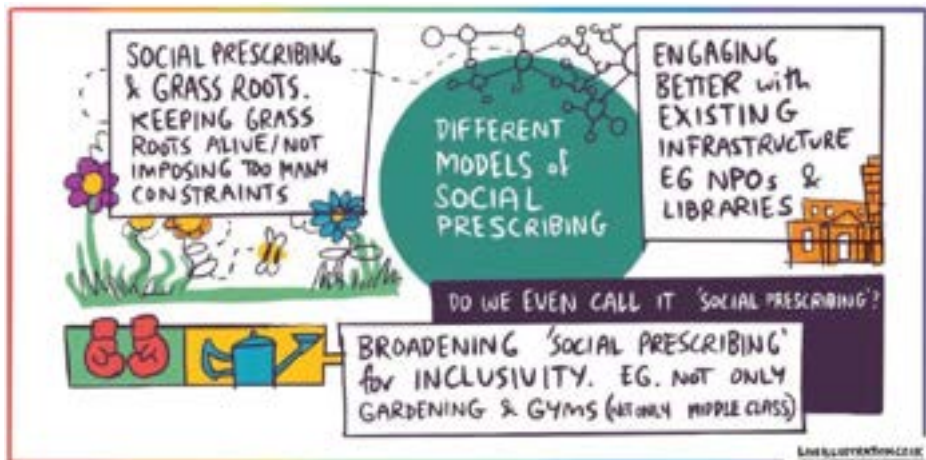
Social prescribing is defined by the NHS as an approach which connects people via a link worker model to their community resources. These may include services, organisations, or various activities to promote health and wellbeing in a holistic manner. This strategy has been formed as part of the NHS’s Personalised Care Plan for all communities that have not had their needs met. People referred to social prescribing can have practical, social and emotional needs met that may result from isolation and loneliness, which might not be met with traditional healthcare provision. Social prescribing may be particularly needed in urban environments, where increased levels of mental illness including anxiety and depression are associated with urbanisation (Ventriglio et al., 2021; Peen et al., 2010). These have been compounded with lockdown due to COVID (Allen et al., 2022).

The NHS developed a Proactive Social Prescribing Service as part of a contract with the Primary Care Networks (NHS England, 2022) as part of their Long Term Plan (NHS England, 2019a). GP surgeries are expected to work with communities with health inequalities to provide unmet needs through proactive social prescribing, aiming to reach 900,000 people by 2023/2024.

A systematic review found that although robust evidence to demonstrate the benefits of social prescribing to mental health and wellbeing is yet to be developed due to suboptimal methodological rigour, 16 out of 17 studies (5036 participants) analysed reported statistically significant improvements in mental health and wellbeing outcomes (Cooper et al, 2022). These interventions included various art and social settings including museums and green initiatives, however no VR studies resulted with the analysis demonstrating the gap in this space.

“Social prescribing changes people and places for the better, and is a catalyst for effective commissioning and providing. [Through social prescribing] ... we can appropriately ‘demedicalise’ aspects of our NHS, and see resilience grow on an individual, an organisational and a societal level.”

(Dr Marie-Anne Essam, GP, cited in NHS England, 2019b)



Audience Research Goals

Audience research was an important element of the ConnectXR project, to understand the effectiveness of an arts-based XR experience with broader wellbeing potential to be deployed within a community setting as an extension to NHS resource.

The specific audience research goals for our selected experience, Soul Paint, were:

Develop and test the **audience journey** for Soul Paint in a public space – what design and hosting considerations are required?

Understand the **feasibility of the library** as a setting for this kind of activity – to what degree did participants find it a suitable location, how comfortable did they feel, and how did it align with their expectations of the library as a community hub?

Evaluate the **experience of users** of the Soul Paint experience – what did they like or dislike, what frictions did they experience, how well did they understand, and how easy was it to use?

Measure the **impact on the wellbeing of users** – how did they feel before the intervention, and how did they feel after? What reflections did they have on the introspective process?

Detect any **population groups** for whom the experience might be particularly significant or beneficial.

As seen in the Innovation Pipeline [diagram](#), the audience research took part as steps 5 and 6 of the overall R&D process. The remainder of this section focuses on the results of the audience research in support of the overall programme.

Research Method

RBWM Library Pilot

A mixed method approach was used to determine the feasibility of Soul Paint, as a representative Health XR experience, running in the community setting of the local public library. The audience journey was carefully planned to ensure optimum positive impact on wellbeing. The entire research team, including hosts, completed Mental Health First Aid training to provide a supportive, positive experience.

Participants were recruited to come and try the VR experience over a 2-week period in November 2023 via the library Facebook page, the library newsletter, an Eventbrite invitation and posters and signs set up in the library and around Maidenhead. Participants could book their sessions or drop in.

Three VR stations were set up in a designated library area with support from three team members including library staff and volunteers to help with onboarding, any support required during the experience and offboarding. All participants provided informed consent and were asked to complete a survey immediately after the survey on iPads available at the research station in the library.



Participants who were willing to be interviewed provided consent to be contacted within the survey and were contacted for interviews in the two weeks following the pilot.

Participants were offered a £5 voucher for the library cafe if they completed the survey and a £15 Amazon voucher was provided to those who completed the interview.

The survey was designed to understand the acceptability of the provision, using VR, using Soul Paint as an experience, as well as understand what people enjoyed, the challenges and potential benefits of the experience. Demographic data was collected to understand who was accessing the experience within this space. 131 surveys were completed.

We invited a representative mix of genders and age groups to be interviewed, selecting from those who had indicated willingness. Interviews were held via Zoom and recorded with consent of participants. Recordings were transcribed for analysis.

Data from qualitative user survey questions and interviews was thematically coded and analysed using MAXQDA.

Research Method (continued)

Torbay spin-off

As a spin-off of this project, and through Hatsumi's network, we also ran a one-day workshop with young users in Torbay. This allowed us to collect feedback from a group of younger people, to understand any differences in their experience compared with the library participants, where the average age was significantly higher.

In the Torbay study, we welcomed 25 students from South Devon College, who participated in staggered groups throughout the day, with a few educators and supervisors also joining in. Participants mainly fell within the age range of 16 to 25. The procedural flow involved participants ascending to the upper floor in small groups, where they were assigned to one of three designated VR rooms with 1-2 hosts.

After obtaining consent and providing a comprehensive briefing, participants engaged in the Soul Paint VR experience, often in pairs or groups of three within each room. Following the VR, participants proceeded to a separate room to complete a survey capturing their feedback. 28 surveys were completed by students and staff.

Similar to the Maidenhead study, the qualitative data gathered from the Torbay participants' survey responses was analysed via MAXQDA. This approach allowed us to identify recurring patterns, themes, and insights within the participants' qualitative feedback, providing a nuanced understanding of their experiences with Soul Paint.



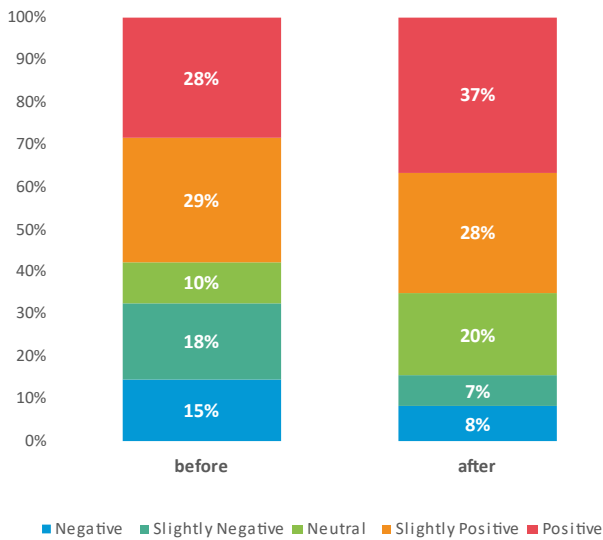
RBWM Pilot - Research Results

The pilot drew a diverse group of participants; the majority of these had little or no previous experience with virtual reality.



RBWM pilot participants, n=131

Feelings before and after SoulPaint in Maidenhead



Enjoyment

- **86%** of pilot participants would recommend to a friend or family member
- **78%** said they would do the Soul Paint experience again

Responses to Soul Paint



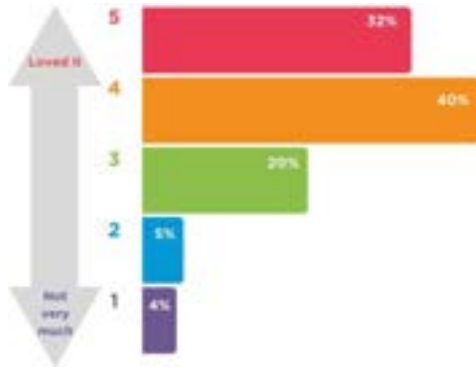
27% had tried VR before
78% said they would do it again



42% felt in a negative or neutral state of wellbeing before they came in
65% felt in a positive state of wellbeing after their experience

RBWM Pilot - Research Results (continued)

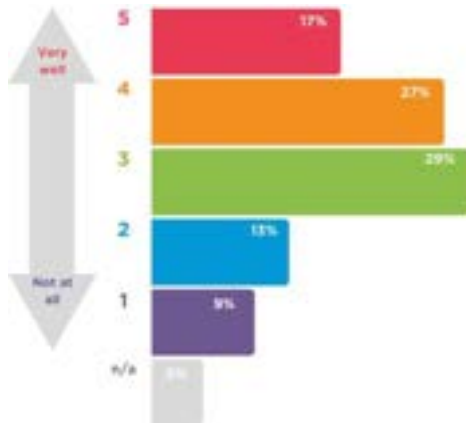
How much did you enjoy your overall experience with Soul Paint ?



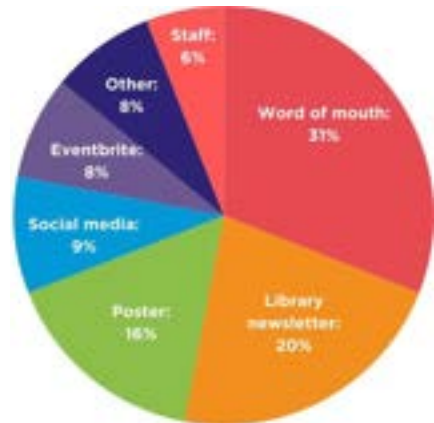
Did you know what to do at all times during the VR experience?



How well were you able to express what you were feeling with the tools that were available to you?



How did you find out about the experience?



Study results indicate that the experience was very well received by Library participants. Enjoyment levels were very high, even though there was slight ambivalence about how well they knew what to do – for over half of participants, the experience was sufficiently clear, but for others – particularly older participants with less technical acumen – some feelings of frustration crept into the experience. When time allowed, hosts permitted participants to try the experience again, finding that the extra practice often significantly improved their ability to interact in the virtual space.

Enjoyment levels were exceptionally high, with a large majority indicating they would recommend or repeat the experience. As well, word of mouth was the most significant driver of awareness about the event. A number of participants told us they heard about the experience by someone who had already been, demonstrating follow-through on that indication to recommend the experience to others.

Feasibility: Acceptance

With 78% of Maidenhead Library participants and 82% of South Devon College participants indicating they would do the experience again, results strongly suggest that participants saw Soul Paint as a useful tool for checking in with emotional and physical wellbeing with which they would like to periodically re-engage, and that they saw the library as a feasible and acceptable place for this. Some participants also indicated they could imagine using Soul Paint at home on a semi-regular basis as part of a self-care routine.

Participants indicated most- and least-liked aspects of the experience.

“Most-liked” aspects:

The creative and sensory experience (36% of participants giving examples in this category). The top aspects were the visual aesthetics of the environment and colours, followed by the sound design, music and narration and the act of painting and ability to be creative.

The affordances of VR as a medium (31%). The chance to try VR, or to try something new was most-cited aspect (higher among adults over age 35), followed by the sense of escape or transportation to a new space outside the body, and the sense of immersion and ability to visualise the emotion they had painted.

The direct effects of the Soul Paint experience (28%). Top in this category was the calming, relaxing feeling after the experience, followed by a sense of mindfulness and being present in their body.



Older participants were very impressed by the virtual environment, with the vivid colours frequently mentioned. Most of all, however, they were very drawn to the novelty of the experience and the chance to try VR, many of them for the first time; this was mentioned much less often by younger participants (35 and under). As this generation ages, and even as older generations are exposed to more immersive technologies, the novelty effect will become a less significant factor of audiences’ enjoyment.

However, the younger participants’ responses reveal what is on the other side of the novelty effect. They were significantly more appreciative of the sense of escape and the feeling of transportation to a new, unknown environment. They spoke of “entering another dimension” and particularly enjoyed “taking a step back and looking at myself” – one likened it to “astral projection”. They were much more likely to mention themes of creativity and freedom to express themselves. Meanwhile, older participants were still able to meaningfully engage, with several expressing a desire to repeat the experience.

Feasibility: Acceptance (continued)

Whereas there was quite a lot of consensus in terms of the most-liked aspects, the least-liked aspects of the experience were much more varied, pointing in many cases to individual preferences, interests and capabilities.

Feedback provided by participants during the pilot has been used to further develop Soul Paint. Some of the technical problems identified by participants early in the pilot, for example, were addressed in an update and were less likely to be mentioned later in the pilot.



These frictions, occurring during a pilot of a prototype, provided vital information for technical development and refinement of implementation. This feedback also pointed to the need for careful event planning and onboarding of participants, with an awareness that individuals have unique needs and preferences.

“Least-liked” aspects:

Confusion about instructions and controllers (36% of respondents).

Some participants were unsure of what to do or how to proceed, and wanting more or better instructions for how to interact. These comments were particularly predominant amongst older respondents.

Scope or design of the experience

(22%). Having had a taste of Soul Paint, top comments here were about wanting an expanded colour palette, wanting more space to move, or wanting more clarity about the storyline/ transitions. A few respondents were surprised by the appearance of others’ body maps and did not feel comfortable speaking aloud to describe their own body map within the public space.

VR frictions (16%). Well-known side-effects of VR use (Whittaker 2023) appeared in this category, ranging from headset discomfort to self-consciousness to eyestrain to being worried about bumping into people or objects in the space. Users reported these common symptoms recurring alongside side effects like difficulty focusing and blurred vision. These were experienced by less than 50% of the respondents, and the majority did not report any side effects.

Technical issues (11%). A few of the participants experienced technical glitches or a crash, and others talked about issues with the VR guardian boundary or a bit of lag in the experience.

No criticism. 15% of respondents could not name a ‘least liked’ aspect or said the experience was entirely positive.

Feasibility: Experience

- **Visual Experience and Feelings:** Analysis reveals 'colour' as the most frequently mentioned word during interviews with participants. Participants commonly expressed positive reactions to the visual experience.
- The shift from negative to positive states of wellbeing can be seen in word clouds representing the descriptors participants gave to 'feelings before' and 'feelings after' the experience

Feelings before the experience



Feelings after the experience



Trying something new

Survey responses highlighted the excitement of trying new technology, particularly for older participants. Trying something new gave them a thought-provoking experience:

- "New technology experience... also made me think." (m, 65+)
- "It is something new and it is good to try new things." (f, 65+)
- "Learning something really new that I hadn't ever experienced before as a more mature person." (f, 65+)

Public health research shows that engagement in new experiences is important for enrichment for older people, who tend to have less opportunity to try new things. For those with dementia, it is particularly important to give people access to something new. Therefore, even though older people might have experienced some frustration in mastering the technology,

there was evidence that having this "beyond the everyday" experience was stimulating and valuable.

The novelty effect might be valuable to older users, but it is presently a well-known response to immersive experiences. As audiences become more familiar with immersive technologies, the novelty effect will be less exploitable. Indeed, with repetition, Soul Paint users would likely experience less of the 'awe' of the novelty of VR but gain more from their competence and able to better engage with the process and the interaction, developing greater interoceptive awareness.

Comments from older users also demonstrate this, even within the limitations of a single use:

- "I sort of relaxed more and felt, well, you know, this was a new and positive thing, to be doing something different."
(Karen, f, 65+)*

* Note: all participant names are pseudonyms

Feasibility: Wellbeing

Three key themes emerged in how people’s experience of Soul Paint affected their sense of wellbeing.

Taking stock

Several people reflected on how Soul Paint provided an opportunity to take stock, or reflect on their physical or emotional states:

- “It definitely made me more aware of what I was feeling and things that I maybe didn’t realise I was feeling...” (Christopher, m, 36-45)
- “Normally you don’t think too much. You just plod on, don’t you, during the day? And it made you think about, you had a knee problem or you were feeling a bit anxious or what have you that day. It made you reflect about something you might not have really thought about too much.” (Karen, f, 65+)
- “It was nice to be able to paint the problems or positive feelings I was having and trying to pinpoint where they were with accuracy.” (survey respondent, m, 16-25, white, Torbay)

Self-compassion

Soul Paint helped people experience self-compassion:

- “I felt that I had more capacity to love myself. And more willingness to be compassionate and love myself than I realised... And I had the experience of feeling fragmented before and then feeling much more whole and solid.” (Molly, f, 56-65)

Connecting with others

There was evidence in qualitative data that Soul Paint allowed participants to develop theory of mind about others’ experience, resulting in a sense of empathy and understanding.

For Miranda who took part in Soul Paint with her mum:

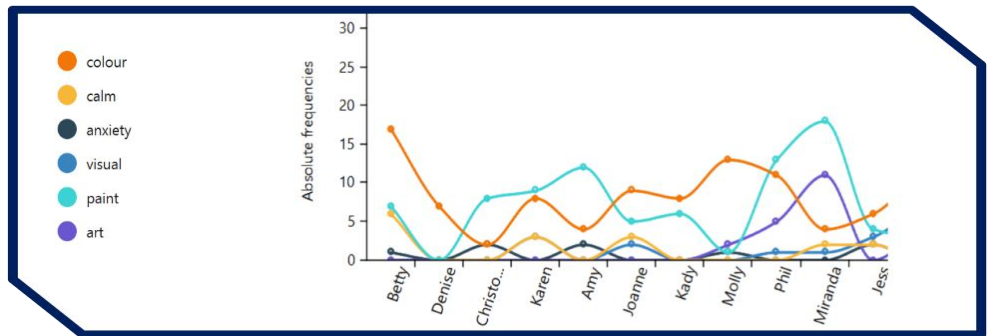
- “I felt it was quite insightful for me to gain a deeper understanding of my mum’s emotional inner world because she’s kind of the person who doesn’t really express her emotions... And that felt quite like a bridge in some ways to talk about her experiences...” (Miranda, f, 26-35)

At the end of the experience, people responded to being surrounded by others’ body maps:

- “It felt like a weight lifted off my shoulders in being able to hear others and what they’ve been dealing with ... amazing and comforting” (survey respondent, m, 16-25, Torbay)
- “It’s really helped to not just hear how other people are feeling, but to see what.. the visual representation of their emotional state is. We’re so self absorbed... we forget that other people are carrying around that as well.” (Jess, f, 36-45)
- “It assured me that I was not alone and it really helped as I think listening to other people made me feel more at ease” (survey respondent, f, 16-25, Torbay)



Using Colour and Art for Wellbeing



A textual analysis of interviews for word frequency revealed connections between people’s experience of colour in Soul Paint and a sense of calm, i.e. those who mentioned “colour” did so in connection with those who mention experiencing a sense of calm (e.g. Betty, Joanne, and Karen). Those emphasizing the concept of “calm” tend to not to mention “anxiety”. This evidences the efficacy of the art therapy basis of the body mapping approach adopted by Soul Paint, and the therapeutic potential of colour and art.

Emotions

Exploring emotions through painting emerged as a significant theme. Participants like Christopher expressed delight in experimenting with various tools to represent their feelings.

- “Once I had the confidence to figure out how the brushes worked, then I just really liked that kind of experience of being able to try different things out and represent my feelings in different ways.” (Christopher, m, 36-45)

Personal anecdotes, like Molly's moving experience of wrapping herself in colours and reflecting on the diverse internal experiences of being alive, further enriched the understanding of emotions in the virtual realm.

- “I wrapped myself in love, pink ribbons of colour, wrapping around my limbs and my organs.” (Molly, f, 56-65)

Drawing tools

Exploring the different brushes, participants like Christopher appreciated the meditative quality of drawing and painting in virtual spaces.

- “What I really loved about the tool brush was the meditative quality of just being able to stand in a space and kind of, you know, draw and paint and kind of just to experience that space.” (Christopher, m, 36-45)

Participants provided insights into their experiences with the colour palette, suggesting areas for improvement.

“Make some of the controls easier like changing the brush and have more colours available.” (Survey respondent, female, 36-45)

Visual representation

The visual representation aspect of Soul Paint was notable for its impact on participants' perceptions.

- “If you are seeing the visual, 3D, life size body and the emotions, you realise how much it is impacting your state of being.” (Jess, f, 36-45)

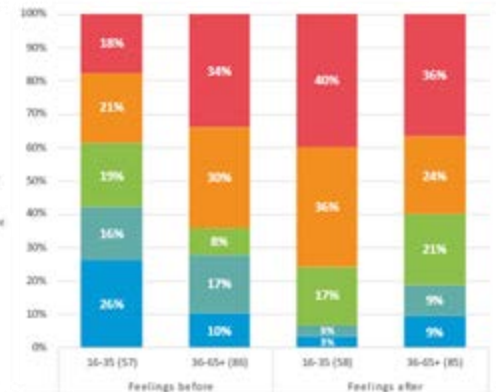
Comparing and Contrasting User Responses by Age Group

Survey respondents were asked to describe how they felt before and after the Soul Paint experience. Conducting a sentiment analysis on these word groups, separating into younger users (age 16-35) and older users (36+) provides some interesting insights into the potential impact of the Soul Paint experience.

Comparing feelings before/after within age groups



Comparing start/end points between age groups



Younger users experienced a stronger positive effect on their feelings after having completed Soul Paint – their negative sentiments decreased quite remarkably.

By contrast, the older group, whose 'before experience' sentiments were 55% positive or slightly positive, felt slightly less positive afterward (44% positive/slightly positive) and somewhat more negative (29% negative/slightly negative before vs 33% negative/slightly negative after). Note that the neutral scores increased much more for older groups than younger groups.

However, comparing before/after responses *between* age groups, the younger group's feelings descriptors before the experience were substantially more negative than older users' descriptors. This has provoked interesting discussions within the team as to whether this is due to higher levels of stress and anxiety amongst younger generations, or a greater willingness to notice or identify negative feelings by younger people than older people.

This may suggest that older people became more aware of negative sensations through the Soul Paint experience, whereas younger people felt more of a sense of 'release'. It may also be an indication of some of the technical frustrations that some members of the older group felt, compared to the ease with which the younger group interacted.

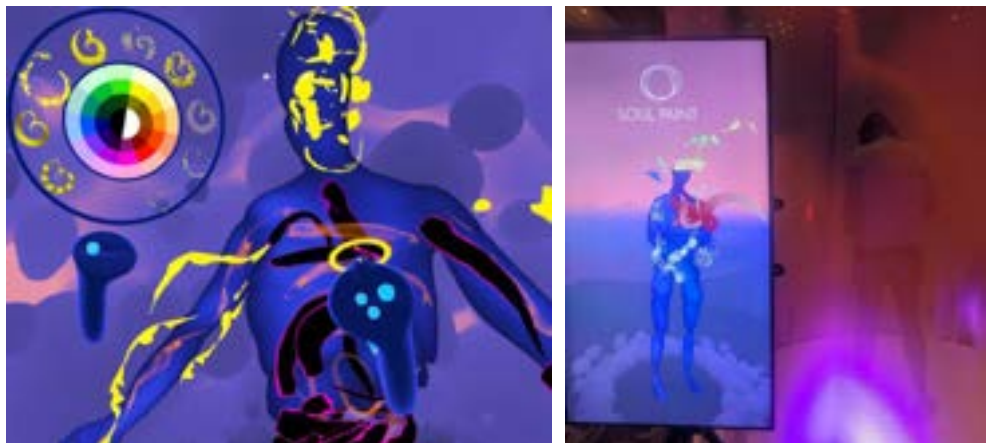
As this was not a controlled experiment, but rather a pilot tested "in the wild," further research would need to be conducted to understand the reasons behind these differences. These results suggest, however, that there may be trends across different user groups that may make them engage in different ways with experiences, and thus require different formats for engagement.

Impact of Audience Research on Iterative Development of Soul Paint

This pilot presented a work in progress version of Soul Paint and a useful opportunity to gather information on what audiences found helpful and what adaptations were suggested. This was fed back to developers during and after the pilot.

Various aspects of the experience were subsequently refined based on feedback, aiming to enhance inclusivity and immersion. Changes included:

- **Avatar design:** A more abstracted avatar design was adopted to cater to diverse body types.
- **Painting tools:** The palette of colours and textures was expanded for greater expressiveness.
- **Script:** The script was tightened, and Hollywood actor and activist Rosario Dawson came on board as the narrator, creating a soothing character to guide audiences through the piece.
- **Enhancing immersion:** Sound design was enhanced to add greater interaction and immersion.
- **Embodiment and interactivity:** The embodiment scene was fine-tuned to encourage playful movement without imposing a dance-like atmosphere.
- **Installation design:** A fuller installation was designed to offer more private spaces for users, with screens showcasing artworks and providing context.
- **Archive:** An archive for viewing others' drawings was created, ensuring GDPR compliance with clear consent processes and data management options. These may be displayed on a screen as part of a Soul Paint installation.



Images courtesy of Hatsumi.
Left: screen capture from Soul Paint
Right: Soul Paint installation at SWSX 2024

A Tool Kit for Future Development

Creative Companies' Journey

This practical guide serves as a toolkit for creative XR companies seeking to develop and implement impactful solutions for health and wellbeing. It provides actionable insights and recommendations on how to navigate the complexities of the healthcare innovation pipeline, covering ten essential areas that creative companies should address throughout their journey. From understanding the NHS framework and establishing effective communication with healthcare partners to ensuring cultural sensitivity and building long-term partnerships, this guide offers practical advice on how to tackle common challenges and engage with key organisations and resources.



Illustrations: ConnectXR Sandpit discussion, 16 January 2024, documented by LiveIllustration.co.uk

1. Understanding NHS and/or local authority framework and constraints

While XR healthcare regulation is still evolving and guidelines may not be entirely clear, creative XR companies can benefit from dedicating time to researching and familiarising themselves with the current regulatory landscape, patient privacy concerns, and health intervention standards. creative XR companies need to dedicate time researching and becoming acquainted with the relevant regulatory requirements, patient privacy concerns, and health intervention standards. Engaging with organisations such as the National Institute for Health and Care Excellence (NICE) or the Medicines and Healthcare Products Regulatory Agency (MHRA) can help companies navigate existing guidelines and regulations that may apply to XR solutions in healthcare. Collaborating with NHS experts early in the development process can help ensure compliance and reduce the risk of future delays or setbacks. Conducting initial user testing with more innovative NHS organisations, such as those that are part of the national [InSites](#) programme, may make it possible to support testing and piloting XR innovations. Additionally, organisations such as the [Health Innovation Network](#) and [NIHR HealthTech Research Centres](#) can provide support, guidance, and advice throughout the development and adoption process, helping companies stay informed about the latest developments in XR healthcare regulation.

Creative Companies' Journey

(continued)

2. Communication and language translation

Effective communication is important when working with healthcare partners, as creative professionals and healthcare providers frequently use different terminology and have different priorities. To bridge this gap, creative XR companies should focus on creating a common language that clearly communicates the value and application of XR technologies in terms that health professionals understand. When communicating with health partners, it is important to emphasise patient outcomes and evidence-based benefits, which are the primary concerns of healthcare providers. Creative companies can join networks and attend events that promote communication between the creative and healthcare sectors, such as those hosted by the [Digital Health & Care Alliance](#) or the soon to launch Virtual Reality in Mental Health Network (VRinMH) driven by the [UKRI Mindset programme](#). These events offer valuable opportunities for knowledge exchange and collaboration, fostering a common understanding among creative professionals and NHS partners. The [XR Health Alliance](#) also supported the development of a 2021 report on XR in health and actively supports companies in partnering with the NHS.

3. Aligning goals with health outcomes

To develop XR solutions that have a significant impact on healthcare, creative companies should align their objectives with the health outcomes prioritised by their NHS partners. This entails closely monitoring the publications and priorities of key NHS organisations such as NHS England (such as the NHS Long term plan), NHS Improvement, and the Department of Health and Social Care. Attending conferences and events hosted by these organisations can provide valuable insights into the current challenges and priorities facing the UK healthcare system. Creative companies can also work with Health Innovation Networks (HINs) to identify local healthcare needs and potential collaborations. When setting goals for XR projects, it is important to establish clear metrics and methods for measuring the solutions' impact on patient experiences, access to healthcare, and community engagement in mental health conversations. It is also important to look at [National Institute for Health and Care Excellence \(NICE\) guidelines](#), which must be followed when providing treatment in the NHS. By demonstrating a measurable impact on key health outcomes, creative companies can gain trust and credibility from NHS partners, increasing the likelihood of their XR solutions being adopted and implemented successfully.



Creative Companies' Journey

(continued)

4. Implement co-creation and stakeholder involvement

Developing XR solutions that meet everyone's needs requires a co-creative approach that involves stakeholders from relevant sectors from the start. The National Institute for Health Research (NIHR) offers programmes to promote industry-academia-NHS collaboration, which creative companies can use to find funding and support for co-creative projects. The NIHR Research Design Service can advise on involving diverse stakeholders like audience representatives, healthcare professionals, funders, and authority-holding decision-makers in the design process to ensure the final product meets healthcare needs. Creative companies can gather stakeholder feedback and iterate their designs by holding workshops and feedback sessions at various stages of development. Companies can work with patient advocacy groups and professional bodies to ensure their solutions meet end-user needs.

Who Are the Key Stakeholders?

For a creative company engaging with the innovation pipeline, the key stakeholders may typically include:

Project Leads from the SME:

These individuals, such as directors and producers, provide the creative vision and drive for the project, ensuring that the XR solution aligns with the company's goals and values.

Health Economics Advisor:

This specialist offers valuable insights into the potential economic impact and value proposition of the XR solution within healthcare settings, helping to demonstrate its cost-effectiveness and benefits to healthcare partners.

Audience/User Research Experts:

These experts, such as senior audience researchers, provide strategies for understanding and evaluating the audience experience, ensuring that the XR solution meets the needs and preferences of its intended users.

Healthcare Academics and Researchers:

These individuals advise on the healthcare research and applications of the XR solution, ensuring that it meets clinical and therapeutic needs and is grounded in evidence-based practices.

Digital and Healthcare Strategists:

These leaders offer long-term strategic perspectives on integrating the XR solution into healthcare pathways, helping to ensure its sustainability beyond the initial funding phase.

Creative and Production Advisors:

These advisors guide the development strategy, ensuring that project milestones are feasible and align with the broader artistic and healthcare goals of the XR solution.

End Users and Patients: These individuals are the ultimate beneficiaries of the XR solution, and their involvement is crucial in ensuring that the solution meets their needs, preferences, and expectations. They can provide valuable insights into the user experience, usability, and potential barriers to adoption, informing the design and development process.

Creative Companies' Journey

(continued)

5. Address ethics and training

Establishing ethical standards for XR solutions and training staff to use them requires close collaboration with NHS and healthcare partners. Creative companies seeking ethical guidance and training materials can partner with universities and academic institutions. Many universities have digital health research centres or departments, and these centres can help develop strong research and evaluation protocols. A good place to start to understand if your project requires NHS ethical approval is the HRA decision tool (<https://www.hra-decisiontools.org.uk>.) The NHS ethical approval process can take upwards of 8 weeks, so creative companies must plan and allow enough time for this process. To ensure community teams such as librarians, NHS teams, and other facilitators can use and implement XR solutions, comprehensive but easy to access and understand training and support materials are needed, including but not limited to how to use guidance documents and onboarding and off boarding of experiences etc. Partnering with academic institutions can also help ensure rigorous XR solution research and evaluation and build a strong evidence base for their efficacy.

6. Feasibility and scalability

When designing XR solutions for healthcare settings, it is important for creative companies to consider the feasibility and scalability of their products within the wider organisation or region. This involves assessing the costs, capacity, and resources required for widespread implementation within the NHS, as well as developing a plan for sustainability beyond initial funding, especially if the project started with a grant. To ensure the feasibility and scalability of their XR solutions, creative companies can engage with organisations like the Digital Health & Care Alliance or the Healthcare UK Advisory Network, which provide support and guidance for companies looking to deploy digital health solutions at scale. The NHS Innovation Accelerator is another valuable resource, offering a structured programme to help companies scale their innovations across the NHS, and the XR Health Alliance can also provide advice. Creative companies should also establish a distribution strategy that maintains the quality and effectiveness of the solution as it scales, ensuring that it can be accessed by a larger number of patients and healthcare providers without compromising its impact.

To ensure community teams such as librarians, NHS teams, and other facilitators can use and implement XR solutions, comprehensive but easy to access and understandable training and support materials are needed.

Creative Companies' Journey

(continued)

7. Conduct economic assessment and value proposition

Performing an economic assessment is a valuable but often forgotten activity for demonstrating the cost-effectiveness and wider economic benefits of an XR solution to healthcare partners, since evidence of benefits, risks, and cost-effectiveness is needed for rollout within the NHS. Creative companies can access expertise in health economic evaluation and value proposition development through consultancies like the York Health Economics Consortium (YHEC) or the Office of Health Economics (OHE). These organisations can help companies conduct economic assessments and develop compelling value propositions that highlight the potential for long-term savings and improved patient outcomes. When assessing the value proposition of an XR solution, creative companies should look beyond monetary savings and consider factors such as upskilling staff, time-saving, and user satisfaction, as these can all contribute to the overall impact and success of the project. It is also important to consider the broader economic benefits, such as improved audience health and wellbeing, particularly in the context of social prescribing models.

Performing an economic assessment is a valuable but often forgotten activity for demonstrating the cost-effectiveness and wider economic benefits of an XR solution to healthcare partners.

8. Cultural sensitivity and adaptability

Designing XR solutions that are accessible and relevant to people from diverse cultural backgrounds is essential for ensuring their widespread adoption and effectiveness. To ensure that their XR solutions are culturally sensitive and adaptable, creative companies can engage with organisations that focus on diversity and inclusion in healthcare, such as the NHS Equality and Diversity Council or the Equality and Diversity Forum. These organisations can provide guidance on involving diverse community groups in the design and development process and ensuring that XR solutions are accessible and inclusive for all users. This can help identify potential barriers to adoption and ensure that the XR solution is tailored to the specific needs and preferences of different cultural groups.

Creative Companies' Journey

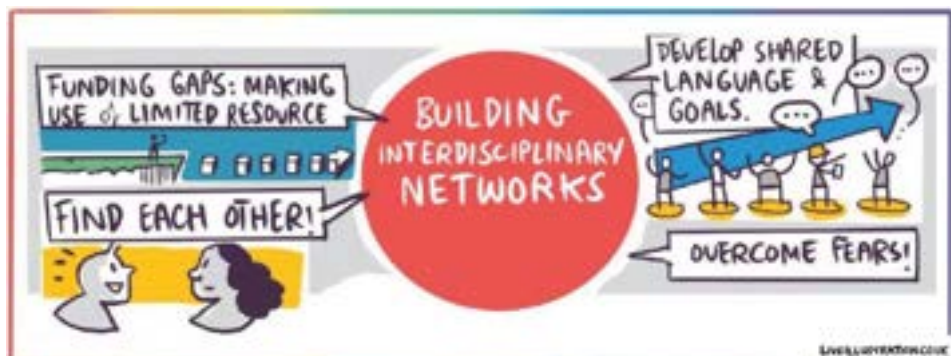
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9. Knowledge exchange and continuous improvement

Regular sharing of knowledge and ideas between creative industry professionals, university experts, and healthcare partners is vital for continuously improving XR solutions and ensuring their long-term success. Joining networks and attending events that facilitate knowledge exchange and collaboration is a worthwhile activity for creative companies looking to stay up-to-date with the latest developments in the field and continuously refine their XR solutions based on feedback from diverse stakeholders. In addition to the valuable experiences gained through the sandpits on this programme, the Digital Health & Care Alliance, and the Virtual Reality in Mental Health Network are just a few examples of communities that bring together diverse stakeholders to share knowledge and best practices related to XR in healthcare. Establishing channels for gathering feedback from users in healthcare or community settings can provide valuable insights into the real-world effectiveness and usability of the XR solution.

10. Long-term partnership and support

Establishing ongoing partnerships and support structures with NHS and healthcare partners will be vital for fostering long-term innovation and ensuring the sustainable impact of an XR solution in healthcare settings. To build long-term partnerships and support, creative companies can engage with organisations that foster collaboration between industry, academia, and the NHS, such as the Health Innovation Networks (HINs) and the NIHR HealthTech Research Centres and the national NHS England Simulation and Immersive Technologies team. These organisations can help companies identify key NHS partners who share their vision for XR in healthcare, provide support for long-term collaborations. Creative companies should develop a roadmap for long-term collaboration with their NHS partners, including regular check-ins and milestone reviews. Offering continuous support and training to NHS partners can help ensure the successful implementation and adoption of XR solutions, as well as provide opportunities for ongoing feedback and improvement. Any initiatives that would support a cross disciplinary community, and pathways for projects to scale and distribute, would be welcome in the sector, which lacks these at present. An organisation such as the Torbay and South Devon NHS Foundation Trust would be well placed to coordinate such an initiative with sufficient funding support.

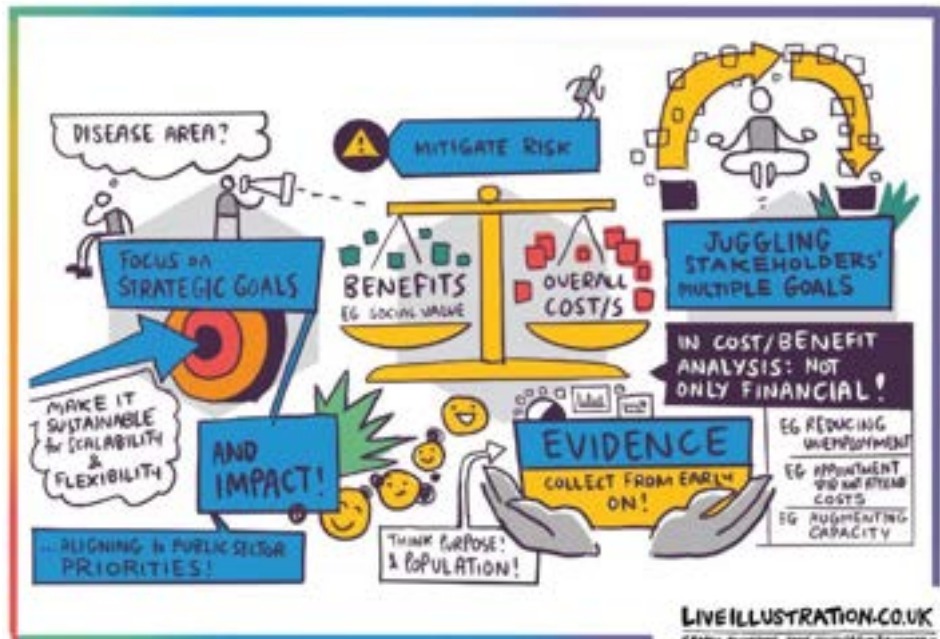


Stakeholders

When working on digital innovation projects in healthcare, creative companies need to navigate a complex landscape with numerous stakeholders. Active engagement with these diverse stakeholders is important to ensuring the successful development, adoption, and scaling of innovative solutions. Local governments, Integrated Care Boards (ICBs), and Regional Implementation Stakeholders are three important stakeholder groups for creative businesses to prioritise. Each group plays a role in connecting innovative projects to communities, aligning with healthcare strategies, and tailoring solutions to regional needs.

Local authorities

Local authorities serve as a bridge between innovative projects and the community. They offer valuable information about local demographics and specific needs. A Digital Inclusion Officer, for example, can provide information about the local population's digital literacy and access to technology, which can be used to inform the design and implementation of digital health initiatives. A Social Prescribing Link Worker can connect patients to digital health resources and support, ensuring that interventions reach those who will benefit the most. A Wellbeing Coordinator can also collaborate with creative companies to incorporate digital interventions into existing local wellbeing programmes and initiatives. Local authorities also play an important role in allocating resources, such as providing access to community centres or libraries for digital skills training and shaping policies that promote the use of new technologies in healthcare.



Stakeholders (continued)

Integrated Care Boards (ICBs)

ICBs are central to the integration of innovative solutions within the broader healthcare system. They ensure that new technologies are consistent with overall healthcare strategies and objectives. For example, an ICB's Chief Clinical Information Officer (CCIO) can evaluate the clinical safety and effectiveness of a proposed digital health solution, ensuring that it is consistent with the ICB's priorities for improving patient outcomes and experience. A Head of Digital Transformation can collaborate with creative companies to create a plan for integrating the solution into existing care pathways and digital infrastructure. Additionally, a Patient Engagement Lead or similar role can facilitate patient and public involvement activities to gather feedback on the solution's acceptability and usability, which will inform future development and refinement. ICBs also provide a platform for regional influence and development, enabling the replication of successful innovations across multiple sites in the region.

Regional implementation stakeholders

Regional stakeholders, such as healthcare professionals, patient advocacy groups, health administrators, and voluntary and community sector organisations, are essential for tailoring digital health solutions to specific regional needs. They provide information about the practical application of digital solutions, the needs and preferences of patients and carers, and the challenges that vulnerable populations face. Engaging with these stakeholders helps to align digital solutions with regional strategies, facilitate connections, and support the expansion of successful innovations. Regions often have different themes and priorities, so it is vital to understand that a one-size-fits-all approach may not be effective. Key positions include Regional Digital Health Advisors, Innovation and Improvement Leads, Health Innovation Networks, Digital Health Leads, and Regional Wellbeing Leads.



Deployment Considerations

The use of XR technologies in social and community settings provides a unique opportunity to create engaging, supportive, and impactful experiences that benefit the health and well-being of individuals and communities. Organisations can ensure that XR experiences are delivered in a way that maximises potential benefits while minimising potential challenges by carefully considering key factors such as those listed below.

Before the XR experience: Preparation and comfort

Prior to the XR experience, it is important to ensure that participants feel prepared and at ease. This involves providing a clear explanation of what to expect during the session, demonstrating how to use the XR equipment, and addressing any concerns or questions they may have. In the case of Soul Paint, it was beneficial to explain and showcase the 'body mapping' function in a non-3D environment to familiarise participants with the concept. This preparation phase is particularly valuable for individuals who are new to XR or may feel apprehensive about the experience. Health and social care teams such as social prescribers and community location staff, such as librarians can play a vital role in this process, ensuring that all participants are well-informed and comfortable before embarking on their XR journey.

During the XR session: Support and guidance

Throughout the XR session, trained staff or facilitators should be available to provide assistance and support. These facilitators, who may be social prescribing staff or librarians trained specifically for this purpose, can walk participants through the XR environment, answer questions, and provide both technical and emotional support, especially if the XR content elicits strong emotional responses. The primary goal is to make sure that all participants feel safe, supported, and confident during their XR experience.

After the XR experience: Reflective discussions

Following the XR session, it is important to create a space for participants to share their thoughts, feelings, and reflections on their experience. This is a critical component of XR sessions that focus on health and wellbeing, as it allows individuals to process and derive meaning from their experience. Social prescribers and community teams can facilitate these discussions, providing guidance and signposting participants to additional resources if necessary.

Emotional health considerations

XR experiences can be highly immersive and emotionally impactful, especially when they explore personal or mental health themes. Providing supportive conversations before and after the XR session, along with compassionate guidance during the experience, is essential for creating a safe, comfortable, and therapeutically beneficial environment. This thoughtful approach to XR facilitation demonstrates its potential as a tool for exploring and expressing emotions with empathy and care.

Deployment Considerations (continued)

Hygiene and safety of XR devices

In libraries and community settings where XR devices are used by multiple individuals, maintaining proper hygiene and cleanliness is paramount. Implementing a rigorous cleaning protocol for XR equipment can help prevent the spread of germs and create a more appealing and trustworthy experience for participants.

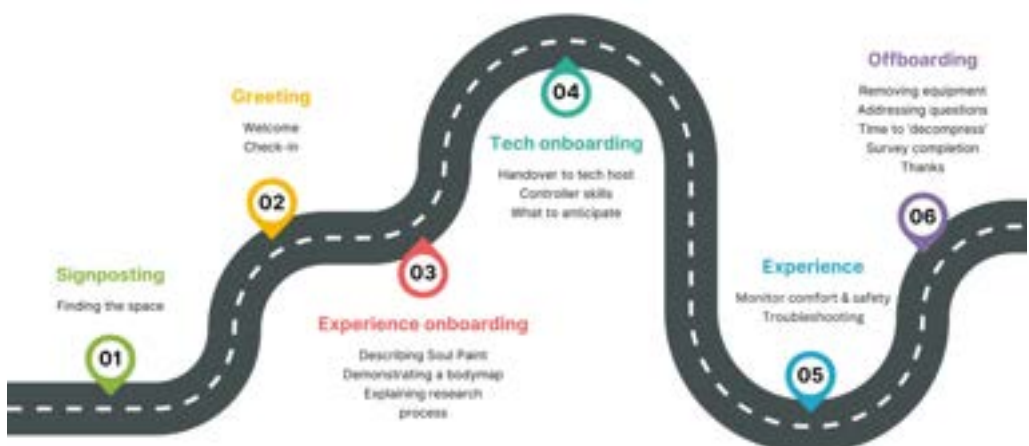
Accessibility and inclusivity

When deploying XR technologies in social and community environments, it is important to consider accessibility and inclusivity. This may involve providing alternative input methods for individuals with physical limitations, offering content in multiple languages, or ensuring that the XR environment is designed with diverse cultural backgrounds in mind. By prioritising accessibility and inclusivity, XR experiences can be made available to a wider audience, promoting equal access to the benefits of this technology.

Staff training and support

To effectively facilitate XR experiences in social and community settings, it is essential to provide comprehensive training and support for staff members. This may include training on the technical aspects of XR equipment, as well as guidance on how to create a welcoming and supportive environment for participants. Regular debriefing sessions and emotional support for staff can help ensure that they are well-equipped to handle the challenges and rewards of facilitating XR experiences.

The Soul Paint audience journey



Physical Space Considerations

When implementing XR technologies in social and community settings, it is as important to consider the physical space in which the experiences will take place as the virtual experience itself. The following factors should be considered to ensure a safe, comfortable, and inviting environment for participants.

Safety

The physical environment should be free of obstacles and hazards that could cause participants to trip, fall, or collide with objects while participating in the XR experience. This may include removing any furniture, wires, or other potential hazards from the area and establishing clear boundaries for the XR play area.

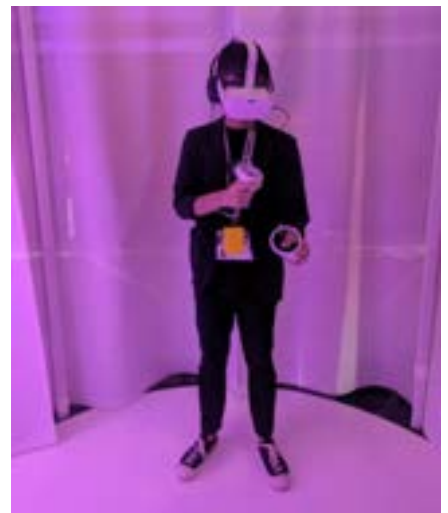
Privacy

Depending on the nature of the XR experience, participants may require access to a private or semi-private space. This is especially important for experiences that address sensitive or personal issues, such as mental health or wellbeing. Ensuring participants' privacy can make them feel more at ease and secure, allowing them to fully participate in the experience without fear of being judged or interrupted.

Size and layout

The physical space should be adequate to accommodate the XR play area, as well as any additional equipment or seating needed by participants and facilitators. The space should be carefully designed to ensure smooth traffic flow, easy access to XR devices, and a comfortable waiting area for participants.

SXSW 2024 Soul Paint installation, incorporating pilot learnings and these design principles



Images courtesy of Hatsumi

Physical Space Considerations

(continued)

SXSW 2024 Soul Paint installation, incorporating pilot learnings and these design principles



Images courtesy of Hatsumi

Lighting and ambience

The physical space's lighting and overall ambience can have a significant impact on participant experience. Soft, diffused lighting can help to create a calming and inviting atmosphere, whereas harsh or glaring lights can be uncomfortable or disorienting. Consider incorporating natural light, adjustable lighting, or calming visual displays to improve the space's ambience.

Accessibility

The physical space should be accessible to people with a variety of needs and abilities. This could include making the space wheelchair accessible, providing seating (ideally swivel chairs) for those who have difficulty standing for long periods of time, or offering alternative XR input methods to participants with limited mobility.

Noise and distractions

Reducing external noise and distractions allows participants to fully immerse themselves in the XR experience. This could include using sound-absorbing materials, providing noise-cancelling headphones, or positioning the XR play area away from high-traffic or noisy areas of the community space.

Cleanliness and hygiene

Maintaining a safe and hygienic environment requires regular cleaning and disinfection of the physical space as well as the XR equipment. This could include developing a cleaning protocol between sessions, providing hand sanitizer to participants, and ensuring proper ventilation to reduce the risk of airborne transmission.

Deployment in Libraries Example

Future roles of libraries in supporting better health outcomes of the community

As community health and wellbeing have increasingly become a focus, various community environments and assets are emerging as vital spaces for deploying innovative digital health interventions. Libraries, in particular, have been recognised as crucial venues for delivering cutting-edge digital health and wellbeing initiatives to the community. Baroness Sanderson of Welton, author of the Independent Review to guide libraries strategy, emphasised the valued role of libraries, stating, “Libraries are a crucial part of our social infrastructure, helping to inspire a love of reading whilst also tackling a host of issues from digital exclusion to loneliness and isolation” (Department for Culture, Media and Sport & Lord Parkinson of Whitley Bay, 2024). [Baroness Sanderson’s report](#) demonstrates that despite their significance, libraries are often overlooked and underappreciated (Sanderson 2024).

XR serves as an example of how libraries can provide accessible venues for cutting-edge digital health and wellbeing initiatives, particularly for audiences who may not otherwise have the opportunity to experience the technology.

However, libraries are not the only community assets that can be harnessed for deploying digital health interventions. Other community spaces, such as village halls, social activity hubs, and leisure centres can also serve as accessible spaces for delivering digital health interventions, such as virtual classes, online workshops, and remote support groups. These community assets can leverage digital technologies to address the unique needs of specific demographics and expand access

to health and wellbeing services, even in the face of challenges like limited healthcare access or mobility limitations. By bringing digital health interventions directly to the communities they serve, these spaces can help overcome barriers to healthcare access and engagement.

To fully realise the potential of libraries and other community assets to promote health and wellbeing through digital innovations, increased capacity, funding, and digital infrastructure are required. Collaboration among community asset staff, social prescribing teams, creative industries, Local Authorities, and Integrated Care Boards (ICBs) is vital for promoting a holistic approach to health that combines clinical care with community-based digital support. Communities can create an inclusive, accessible, and effective model of care by leveraging the potential of these partnerships and resources, which has the potential to transform health outcomes and improve community well-being in an increasingly digital world.

Locating XR initiatives in libraries can be especially valuable for reaching the most vulnerable populations or those who struggle to access traditional health services due to various barriers such as mobility limitations, social isolation, or cultural and language differences.

By offering digital health interventions in familiar and trusted community spaces, libraries can help bridge the gap in healthcare access and engagement for these underserved groups.

Social Prescribing Teams

Social prescribing (SP) and community health teams can play a crucial role in the deployment and integration of health innovations into the community. These on the ground teams can introduce XR technologies and ensure they align with local health priorities and can facilitate user interactions with the technology as part of supporting digital activities. They will be integral in assessing the sustainability and scalability of these interventions, sharing knowledge with Integrated Care Boards (ICBs), and exploring collaborative opportunities for wider implementation.

Here's how those teams can effectively utilise the pipeline for the benefit of their communities:

Embracing Community-Based XR Applications

By demonstrating use in library settings, the pipeline encourages exploring XR deployment in community spaces like village halls, churches, and community centres. This approach enables teams to bring health interventions directly to where people are, fostering inclusivity and accessibility.

Gaining Insights from Creative and Academic Collaborations

The pipeline stresses the importance of collaboration with creative industries and academia, and doing so early on. These partnerships provide teams with innovative approaches and robust evaluation methods.

Economic and Value Assessments

Understanding the cost-effectiveness of XR interventions enables teams to make informed decisions about resource allocation and scalability and will help to instil confidence with funding bodies and commissioners. The economic business guide within this report can help serve teams with understanding the how, what and why of writing a business case.

Knowledge Transfer and Stakeholder Engagement

Engaging with a diverse range of stakeholders, as suggested by the pipeline and with the sandpit event method, broadens the scope and impact of XR interventions. This includes involving creatives, researchers, funders and local service providers to encourage perspective and experienced feedback.

Adopting Co-Design Approaches

Co-designing XR solutions with community and stakeholder input, such as health workers, the general public, people with lived experience, ensures that the interventions are tailored to the actual needs and preferences of the end-users.

Supporting Training and Familiarisation

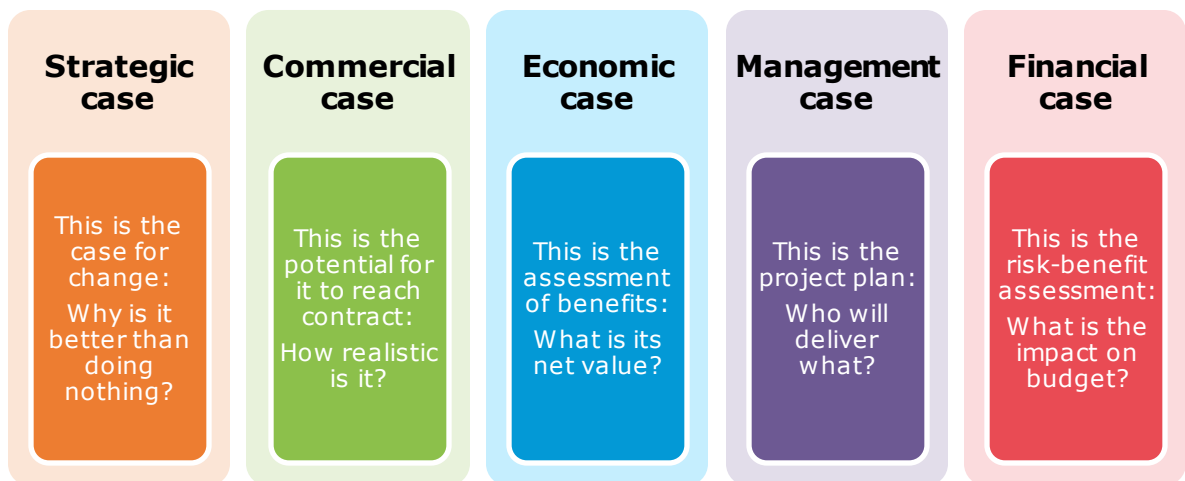
Familiarisation and training with these tools is crucial for their effective implementation, integration and sustainability through teams facilitating and championing its use into health and wellbeing services.

Business Case Development for Creative Companies

One of the biggest challenges facing the growth of XR in health and wellbeing solutions is the lack of robust evidence and data to support the potential impact and value of XR experiences on users and the potential revenue and investment an enterprise needs for further development.

The [Five Case Business Model](#), which all public bodies are required to use, is set out here as a way to build the health economics needed to demonstrate this value, particularly when considering the health and social care economy. This is a helpful model to understand particularly when looking for support from the public health sector but is also a useful model to build into any XR in health business case development as it captures specific requirements not often considered within the creative XR industries.

This business case model emphasises that the case must be strongly made that the product in development will significantly improve health, deliver cost savings, or will deliver on priorities or key performance indicators over and above what is already being delivered. The easiest case to make is that your product is cheaper but you must also consider the implementation costs and inconvenience of replacing the existing product. Often, there will not be a product against which you can compare. In this instance, it is essential that you engage with stakeholders to identify priorities and key performance indicators that your product may be able to support.



The outline of this model is available online (see [The Green Book](#)) with guidance on the different sections.

Training is available through organisations such as [Medilink](#), which can help you to better understand how your product can fit within the health and social care economy or develop your business case further.

The Value Proposition

A value proposition provides a concise statement on the benefits that are delivered to the customer. In the context of creative XR for health and social care, this needs to consider what value it can bring based on who the payer will be, how it is different to what is already out there, and how you can best provide evidence of this.

Payers

There is not a single health and social care payer – the NHS does not often commission at a national scale. Further information on how health and social care is funded can be found here:

<https://www.kingsfund.org.uk>

Therefore, you will need to consider payers at more local levels. Stakeholder mapping is a useful exercise to identify who is providing health and social care within specific areas. Typically, these include:

- NHS (including secondary and primary care)
- Talking Therapies (IAPT)
- Local Authorities
- Charities and third sector
- Private healthcare
- Employee wellbeing services
- Education wellbeing services



Evidence generation

The National Institute for Health and Care Excellence, NICE, have a Digital Health Technology Evidence Framework that can be used to identify what types of evidence are needed. This covers different types of interventions, from those aimed more at providing a system service to those designed to provide treatment. Evidence for each of these types of interventions is outlined across design, the value, performance, and delivery offering clear examples of the minimum evidence standard sought.

- Evidence standards framework for digital health technologies: <https://www.nice.org.uk/about/what-we-do/our-programmes/evidence-standards-framework-for-digital-health-technologies>

The UK Government also provides guidance on how to evaluate digital health products.

- Evaluating Digital Health Products (UK Government): <https://www.gov.uk/government/collections/evaluating-digital-health-products>

The Value Proposition (continued)

Data sources

As the ConnectXR project has demonstrated, primary research is required for the business case, and can involve qualitative methods such as stakeholder workshops or quantitative methods such as surveys. Other sources of data can also support the development of the value proposition. At a local level, reports such as the [Joint Strategic Needs Assessment](#) (Department of Health and Social Care, 2011) can highlight local priorities. Others include:

- Public Health Profiles (Fingertips data) <https://fingertips.phe.org.uk>
- NHS Digital <https://digital.nhs.uk/data>
- Mental Health Data Hub <https://digital.nhs.uk/data-and-information/data-tools-and-services/data-services/mental-health-data-hub>
- NHS Mental Health Dashboard <https://www.england.nhs.uk/publication/nhs-mental-health-dashboard/>
- NHS RightCare <https://www.england.nhs.uk/rightcare/>
- Secondary Use Services <https://digital.nhs.uk/services/secondary-uses-service-sus>
- Future NHS Platform <https://future.nhs.uk/>
- Mental Health Services Currency and Payment <https://digital.nhs.uk/data-and-information/data-tools-and-services/data-services/mental-health-data-hub/mental-health-services-currency-and-payments>



Certification, Accreditation and Regulation

The NHS Digital Technology Assessment Criteria for Health and Social Care (DTAC)

The [DTAC](#) is a set of criteria for organisations to use when introducing new digital health technology. It brings together legislation and good practice guidelines into the new national baseline criteria for digital health technologies within the NHS and Social care. Used at the point of procurement, it sets out four sections for developers to demonstrate what is needed to meet these standards. This includes information about the company and product, the value proposition, a comprehensive technical assessment, and core principles for adoption within the NHS (e.g. usability).

Curated app libraries

Within the UK there are several curated app libraries that bring together digital health applications that have been through various assessments and processes to ascertain their suitability (technical, clinical, and/or user-facing). Some examples include ORCHA and AppScript, which use their own assessment processes that closely mirror the DTAC and can be integrated into existing medical record systems.

Regulation of medical devices

The Medicines and Healthcare products Regulatory Authority (MHRA) is the UK regulatory body responsible for ensuring the safety, quality, and effectiveness of medical devices, including software as a medical device. Classification is based on the intended purpose of the intervention and the level of risk to patients; low-risk devices (Class 1) are subjected to less stringent evaluations and conformity can be self-declared. Regulations help to ensure that medical devices are safe and effective, and meet the necessary standards for quality and performance. Those that have been approved are provided with the UKCA mark (previously CE mark) which gives healthcare professionals and patients confidence in their use.

The UK Government provides an overview of [regulating medical devices in the UK](#) and the MHRA can be approached to discuss whether an intervention is a medical device – this should be done as early as possible.

The National Institute for Health and Care Excellence

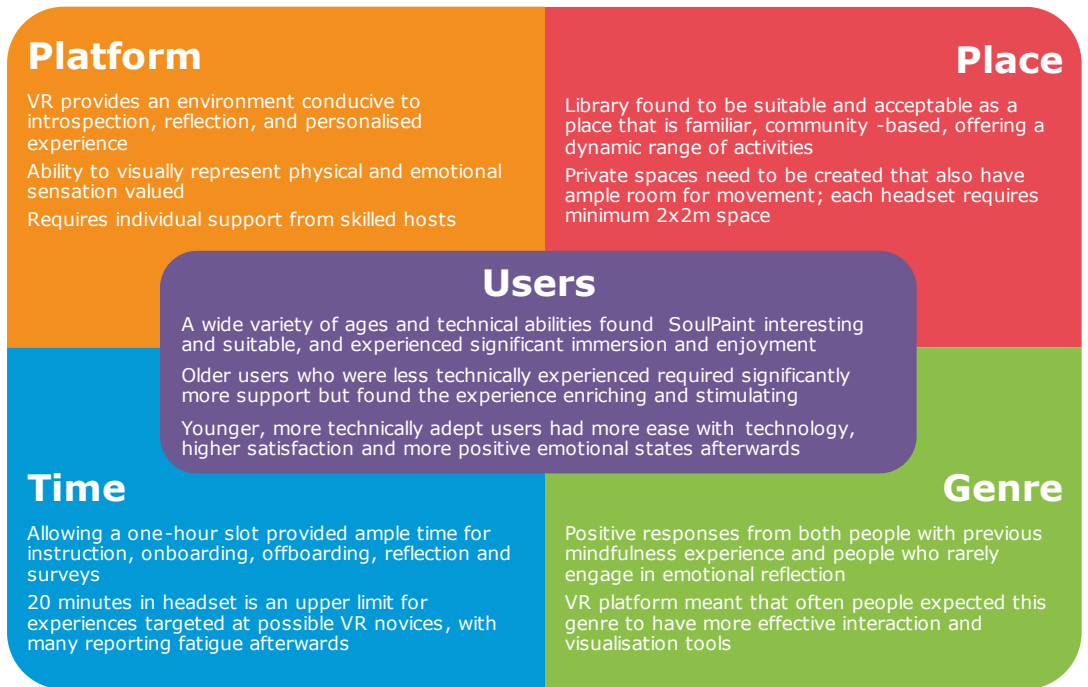
NICE is a UK public body that offers evidence-based guidance in the use of health technologies, clinical practice, health promotion and social care. The NHS is legally obliged to provide funding for interventions that have been recommended under NICE guidelines, all of which undergo an economic evaluation to ensure that they offer better value than similar interventions.

Prior to developing clinical guidelines, they can develop an [Early Value Assessment](#) of medical technologies, which provides an overview of a product's clinical and cost effectiveness for the NHS. This has included one that assessed virtual reality technologies, in the context of treatment for agoraphobia.

Defining User Value

The StoryFutures Audience Insight Team has developed an immersive audience framework that can be used as an analytical tool for mapping immersive experiences from the perspective of users. It provides a set of prompts across important elements of XR development, and is useful at planning, development and evaluation stages.

Here, for example, it is used to synthesise findings from the pilot of Soul Paint across the RBWM Library pilot and the Torbay spin-off.



Download the interactive template here.

Key Learnings

Bridging the Chasm Between Creative Industries and Healthcare

One of the most important takeaways from the development and implementation of XR technologies in healthcare is the identification of a "chasm" between the creative and healthcare industries. This gap manifests itself in a variety of ways, including differences in language, knowledge, and understanding of design and technology, all of which can impede effective collaboration and implementation of innovative XR applications in healthcare environments.

The language barrier between the creative and healthcare industries presents a challenge. Creative professionals and healthcare providers frequently use different terminologies and priorities, making it difficult to communicate effectively and align goals. This language gap can also have an impact on the ability to secure funding for XR projects, as it is unclear whether a specific fund is more focused on healthcare or creative initiatives, and the language used in applications must be tailored accordingly. During our sandpit and workshops event, stakeholders stated that teams combining clinical and creative expertise frequently face difficulties in obtaining the necessary funding. These projects, which combine healthcare and creative ideas, are frequently hampered by funding criteria that are either too focused on healthcare, requiring strict clinical results and evidence, or too geared towards the arts, failing to meet the unique needs of healthcare applications. This situation demonstrates a need in the funding landscape for a more balanced approach that acknowledges the unique nature of these interdisciplinary projects.

Additionally, there is frequently a gap in knowledge and understanding of design and technology between the creative and healthcare industries. Creative professionals may have a thorough understanding of the technical aspects and potential applications of XR, whereas healthcare providers may be more concerned with clinical and wellbeing outcomes and patient care. Bridging this knowledge gap is vital for developing XR solutions that are not only technologically advanced but also clinically applicable and effective.

Bridging the chasm between the creative industry and healthcare requires ongoing collaboration, communication, and mutual understanding. By establishing a mechanism that can facilitate these relationships and translate between the two worlds, we can unlock the full potential of XR technologies in healthcare and drive the development of innovative solutions that transform patient care and improve outcomes. This will require a concerted effort from both industries to learn from each other, share knowledge, and work together towards a common goal of improving health and wellbeing through the power of immersive technologies.



ConnectXR Sandpit table discussions, January 2024

Future Use Cases and Applications

Future XR Health Projects

- Consider the implementation and use context as early in development as possible to maximise the value of XR experiences for audiences/users, using the audience insight framework (direct link) to guide considerations.
- Identify the value the XR experience provides for specific audiences and use cases beyond the novelty effect, and customise engagement and support needs for different audiences at implementation (e.g. consider any additional support needs or modes of implementation that technology novices may require)
- Develop appropriate outcome measurements specific to the experience; embed these into the experience where possible
- Consider a range of locations and services for implementation beyond social prescribing that are avenues for using innovation for wellbeing, e.g. work environments through occupational health; study environments through student wellbeing; existing community groups and charities that already collaborate with arts funding bodies.



Creating Future XR in Health Solutions

Developing the XR Health Ecosystem

Networking and collaboration requirements

- A strategic, sustainable and national XR in health network is needed, which can bring together stakeholders across multi-agencies to discuss challenges, opportunities and strategies for bringing XR health applications into healthcare and communities.
- Collaboration with service users, health staff, and those invested in health and social care can ensure that XR health solutions are problem-focused and can fit to the unique needs of the health and social care system. This can help to develop the value proposition but can also be used earlier in the ideation phase to understand where XR is most appropriate and relevant.
- The regulation of XR has been slow in health and social care. More engagement is needed between regulators, developers, researchers, and clinicians to better understand and help to overcome barriers.

Collaborative R&D approaches

- There is a lot of heterogeneity in how XR health economics are evaluated (Gómez Bergin and Craven, 2023). It is important to develop models that can be easily applied in different health contexts.
- The benefits of creative XR for health need to be demonstrated through high quality evidence, necessitating collaboration between the creative industries and academics. Approaching business managers at universities can help link you to researchers.
- Further research is needed to develop appropriate outcome measures (e.g. mood, wellbeing, pain, fatigue etc) that can be embedded within XR experiences across the sector. These need to be clinically appropriate and demonstrate outcomes that are important to the health and social care system.
- Payers are unlikely to adopt XR health interventions that do not have sufficient evidence that they are able to achieve their intended purpose and are able to do so more cost-effectively than competitors. Providing them with a five-case business model can save them time and clearly demonstrate the value that your product can provide.

Creating Future XR in Health Solutions (continued)

Developing the XR Health Ecosystem (continued)

Develop funding suited to the collaborations between health, XR and the arts

- During our sandpit and workshops event, it was felt from our stakeholders that teams that bring together clinical and creative expertise often face challenges in securing the right funding. These projects, which blend healthcare and creative ideas, usually run into problems because the funding criteria are either too focused on healthcare, demanding strict clinical results and evidence, or too geared towards the arts, not meeting the specific needs of healthcare applications. This situation reveals a need in the funding landscape for a more balanced approach.

Developing new distribution networks

- The NHS England Immersive, Simulation and Related Technologies Dynamic Purchasing System (DPS) is a centralised platform that enables NHS organisations to evaluate and purchase XR and simulation technologies by streamlining the procurement process and providing an approved channel. For more information about this route, contact NHS London Procurement Partnership (LPP) at cds@gstt.nhs.uk.

However, the DPS is tailored for digital distribution in clinical settings. A platform that includes XR in wellbeing solutions in non-clinical settings would provide a centralised distribution platform for NHS and Local Authorities, allowing greater scalability for enterprises and greater access for libraries and social prescribing teams.

Recommendations for Creative Companies

Drawing from the project's experience, here are key recommendations for creative companies undertaking innovative health and wellbeing projects:

Understand health and wellbeing pathways

Develop a deep understanding of health and wellbeing pathways, which includes knowledge about funding and the long-term sustainability of innovative technologies.

Create training programmes

Develop training and onboarding programmes for healthcare and community teams, such as librarians to enhance their confidence and skills in new technologies to help their long-term use.

Structured feedback

Implement a methodical process to collect, analyse, and incorporate feedback, prioritising changes based on their impact and practicality.

Conduct pilot tests

Ensuring necessary permissions are in place, carry out pilot tests in various but relevant environments to obtain a broad range of feedback and to understand how the project functions in real-world settings.

Involve diverse stakeholders

Engage with a wide range of stakeholders, including healthcare professionals, users, and community representatives, from the early stages to gain a range of insights.

Think implementation

Consider implementation strategies from the very start of the project and bring experts and users on board early.

Develop effective communication strategies

Clearly and effectively communicate the benefits and possible uses of the technology to stakeholders, especially those in the healthcare sector.

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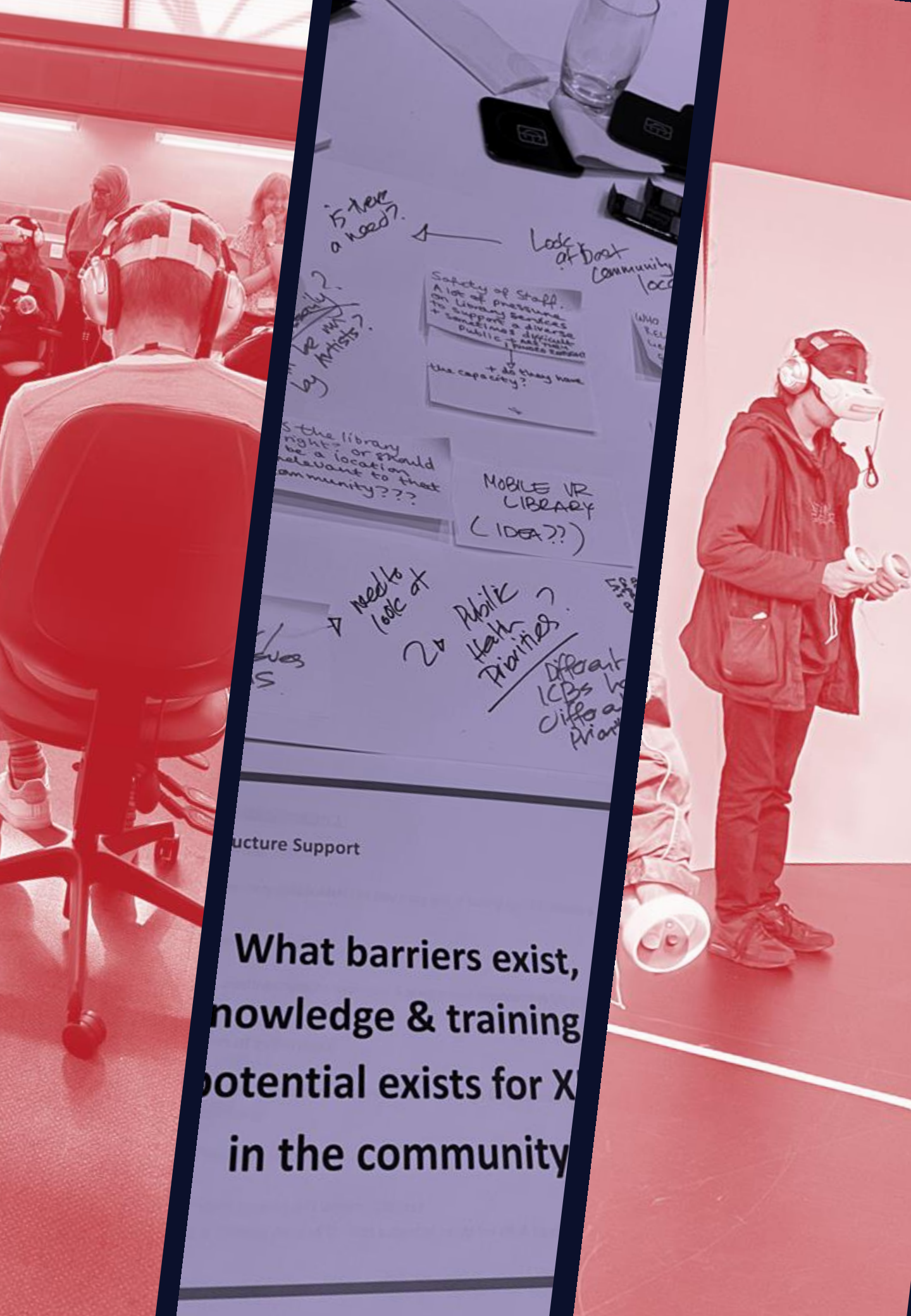
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References

- Adams, D., Bah, A., Barwulor, C., Musabay, N., Pitkin, K., & Redmiles, E. M. (2018). Ethics emerging: The story of privacy and security perceptions in virtual reality. *Proceedings of the Fourteenth USENIX Conference on Usable Privacy and Security*, 7. <https://dl.acm.org/doi/10.5555/3291228.3291263>
- Allen, J., Darlington, O., Hughes, K., & Bellis, M. A. (2022). The public health impact of loneliness during the COVID-19 pandemic. *BMC Public Health*, 22(1), 1654. <https://doi.org/10.1186/s12889-022-14055-2>
- Cooper, M., A very, L., Scott, J., Ashley, K., Jordan, C., Errington, L., & Flynn, D. (2022). Effectiveness and active ingredients of social prescribing interventions targeting mental health: A systematic review. *BMJ Open*, 12(7), e060214. <https://doi.org/10.1136/bmjopen-2021-060214>
- Department for Culture, Media and Sport & Lord Parkinson of Whitley Bay. (2024). *Independent Review to guide libraries strategy in 2024*. GOV.UK. <https://www.gov.uk/government/news/independent-review-to-guide-libraries-strategy-in-2024>
- Department of Health and Social Care. (2011). *Joint Strategic Needs Assessment and joint health and wellbeing strategies explained*. Department of Health. <https://www.gov.uk/government/publications/joint-strategic-needs-assessment-and-joint-health-and-wellbeing-strategies-explained>
- Dozio, N., Marcolin, F., Scurati, G. W., Ulrich, L., Nonis, F., Vezzetti, E., Marsocci, G., La Rosa, A., & Ferrise, F. (2022). A design methodology for affective Virtual Reality. *International Journal of Human-Computer Studies*, 162, 102791. <https://doi.org/10.1016/j.ijhcs.2022.102791>
- Fancourt, D., & Finn, S. (2019). *What is the evidence on the role of the arts in improving health and wellbeing? A scoping review* (Health Evidence Network (HEN) Synthesis Report 67). WHO Regional Office for Europe. <https://www.who.int/europe/publications/i/item/9789289054553>
- Finck, C., A vila, A., Jiménez-Leal, W., Botero, J. P., Shambo, D., Hernandez, S., Reinoso-Carvalho, F., & Andonova, V. (2023). A multisensory mindfulness experience: Exploring the promotion of sensory awareness as a mindfulness practice. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1230832>
- Gómez Bergin, A. D., & Craven, M. P. (2023). Virtual, augmented, mixed, and extended reality interventions in healthcare: A systematic review of health economic evaluations and cost-effectiveness. *BMC Digital Health*, 1(1), 53. <https://doi.org/10.1186/s44247-023-00054-9>
- Hacmun, I., Regev, D., & Salomon, R. (2018). The Principles of Art Therapy in Virtual Reality. *Frontiers in Psychology*, 9. <https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2018.02082>
- Jyskä, I., Puura, K., & Turunen, M. (2022). Therapeutic Potential of Interactive Audiovisual 360-Degree Virtual Reality Environments for Anxiety Reduction—A Case Study with an Abstract Art Application. *Applied Sciences*, 12(18), Article 18. <https://doi.org/10.3390/app12189316>
- Kilkelly, F., O'Brien, R. and Ticho, S. (2021) *The Growing Value of XR in Healthcare*. Available at: <https://www.xrhealthuk.org/the-growing-value-of-xr-in-healthcare> (Accessed: 18 May 2021).
- Lessick, S., & Kraft, M. (2017). Facing reality: The growth of virtual reality and health sciences libraries. *Journal of the Medical Library Association*, 105(4). <https://doi.org/10.5195/jmla.2017.329>
- Makransky, G., & Petersen, G. B. (2021). The Cognitive Affective Model of Immersive Learning (CAMIL): A Theoretical Research-Based Model of Learning in Immersive Virtual Reality. *Educational Psychology Review*, 33(3), 937–958. <https://doi.org/10.1007/s10648-020-09586-2>
- Montana, J. I., Matamala-Gomez, M., Maisto, M., Mavrodiev, P. A., Cavallera, C. M., Diana, B., Mantovani, F., & Realdon, O. (2020). The Benefits of emotion Regulation Interventions in Virtual Reality for the Improvement of Wellbeing in Adults and Older Adults: A Systematic Review. *Journal of Clinical Medicine*, 9(2), 500. <https://doi.org/10.3390/jcm9020500>
- NHS England. (2019a). *NHS Long Term Plan*. NHS England. <https://www.longtermplan.nhs.uk/>
- NHS England. (2019b). *Social prescribing represents the most effective, wide reaching and life changing of all initiatives to date: A GPs perspective*. <https://www.england.nhs.uk/personalisedcare/comprehensive-model/case-studies/social-prescribing-represents-the-most-effective-wide-reaching-and-life-changing-of-all-initiatives-to-date-a-gps-perspective/>
- NHS England. (2022). *Personalised care: Social prescribing; shared decision making; digitising personalised care and support planning* (Network Contract Directed Enhanced Service). NHS England. <https://www.england.nhs.uk/publication/network-contract-directed-enhanced-service-personalised-care/>
- Page, S. and Coxon, M. (2016) Virtual Reality Exposure Therapy for Anxiety Disorders: Small Samples and No Controls?, *Frontiers in Psychology*, 7. <https://doi.org/10.3389/fpsyg.2016.00326>

References (continued)

- Peen, J., Schoevers, R. A., Beekman, A. T., & Dekker, J. (2010). The current status of urban-rural differences in psychiatric disorders. *Acta Psychiatrica Scandinavica*, 121(2), 84–93. <https://doi.org/10.1111/j.1600-0447.2009.01438.x>
- Sajnani, N., & Fietje, N. (2023). The Jameel Arts & Health Lab in collaboration with the WHO–Lancet Global Series on the Health Benefits of the Arts. *The Lancet*, 402(10414), 1732–1734. [https://doi.org/10.1016/S0140-6736\(23\)01959-1](https://doi.org/10.1016/S0140-6736(23)01959-1)
- Sanderson, B. E. (2024). *An independent review of English public libraries* [Policy paper]. Department for Culture, Media and Sport. <https://www.gov.uk/government/publications/an-independent-review-of-english-public-libraries-report-and-government-reponse/an-independent-review-of-english-public-libraries>
- Simón-Vicente, L., Rodríguez-Cano, S., Delgado-Benito, V., A usín-Villaverde, V., & Cubo Delgado, E. (2022). Cybersickness. A systematic literature review of adverse effects related to virtual reality. *Neurología*. <https://doi.org/10.1016/j.nrl.2022.04.009>
- Stuckey, H. L., & Nobel, J. (2010). The Connection Between Art, Healing, and Public Health: A Review of Current Literature. *American Journal of Public Health*, 100(2), 254–263. <https://doi.org/10.2105/AJPH.2008.156497>
- Vaughn, P., Tewson, A., Morgan, P., & Boydell, K. M. (2023). 'Chains Weigh Heavy': Body Mapping Embodied Experiences of Anxiety—ProQuest. *The Qualitative Report*, 28(2), 583–606. <https://doi.org/10.46743/2160-3715/2023.5712>
- Ventriglio, A., Torales, J., Castaldelli-Maia, J. M., De Berardis, D., & Bhugra, D. (2021). Urbanization and emerging mental health issues. *CNS Spectrums*, 26(1), 43–50. <https://doi.org/10.1017/S1092852920001236>
- Whittaker, L. (2023). Onboarding and offboarding in virtual reality: A user-centred framework for audience experience across genres and spaces. *Convergence: International Journal of Research into New Media Technologies*, 13548565231187328. <https://doi.org/10.1177/13548565231187329>
- Wienert, J., Jahnel, T., & Maaß, L. (2022). What are Digital Public Health Interventions? First Steps Toward a Definition and an Intervention Classification Framework. *Journal of Medical Internet Research*, 24(6), e31921. <https://doi.org/10.2196/31921>
- Yildirim, C., & O'Grady, T. (2020). The Efficacy of a Virtual Reality-Based Mindfulness Intervention. *2020 IEEE International Conference on Artificial Intelligence and Virtual Reality (AIVR)*, 158–165. <https://doi.org/10.1109/AIVR50618.2020.00035>
- Zallio, M. and Clarkson, P.J. (2022) 'Designing the metaverse: A study on inclusion, diversity, equity, accessibility and safety for digital immersive environments', *Telematics and Informatics*, 75, p. 101909. <https://doi.org/10.1016/j.tele.2022.101909>.
- Zhu, Q., Yuan, L., Xu, Z., Yang, L., Xia, M., Wang, Z., Liang, H.-N., & Ma, X. (2024). From reader to experimenter: Design and evaluation of a VR data story for promoting the situation awareness of public health threats. *International Journal of Human-Computer Studies*, 181, 103137. <https://doi.org/10.1016/j.ijhcs.2023.103137>



Is there a need?

Look at Best Community loc

Safety of Staff.
A lot of pressure on library services to support a diverse public - difficult to meet + do they have the capacity?

Is the library right? or should be a location relevant to that community???

MOBILE VR LIBRARY (IDEA??)

need to look at

Public Health Priorities?

Direct ICBS health care priorities

Structure Support

What barriers exist, knowledge & training potential exists for X in the community