LCR4.0 HOLISTIC

CREATIVE ARTS DIGITAL SANDPIT



WITH





European Union European Regional Development Fund



Culture LIVERPOOL

Creating a Digital Creative Arts Eco-System for the Liverpool City Region

The recent Liverpool City Region five-year plan for culture highlights the key role that arts and culture play in the city region's economy whilst supporting health and wellbeing.

The Creative Arts industry employs over 24,000 people in the Liverpool City Region alone. This industry is a major contributor to the regional visitor economy, worth \pm 4.3bn, which welcomed over 62m visitors, and is the second largest contributor to the region's economy.

Major art organisations in the region contribute over £32m and employ more than 1,000 people. Wider LCR arts organisation provide £60m in GVA. Each £1 invested into the arts by the local authority generates £11.14, contributing to the local economic impact. Culture is not only seen as a catalyst for the visitor economy but also drives urban change, nowhere more so than in Liverpool Regions like the Baltic Triangle and Northern Docks.

The arts industry faces several challenges, not least the recovery from COVID-19 and current economic challenges, but also ingrained industry hurdles such as time and headspace to innovate and upskill digitally, in addition to accessing additional funding and developing the right partnerships.

In their 2020-2030 Strategy, Arts Council England is keen to see the sector adopt new technologies. As customer habits change due to technological opportunities, Arts Council England expects the sector to become early adopters, developing new technology to amplify new work, re-imagine culture for audiences of today, and experiment with new ways of reaching the public. As technology continues to develop at great speed, partnerships within both the technology sector and higher education are needed to support the sector.

Georg Meyer

Industrial Innovation Lead at the Virtual Engineering Centre

A psychologist and human factors specialist, working with such a wide range of creative arts stakeholders as represented in this sandpit has been an amazing experience for all at the Virtual Engineering Centre.

The sector is already defined by very close links between organisations and a real enthusiasm to exploit new digital technologies to make the unique cultural offering, which characterises the Liverpool City Region, available to a wider audience. This enables us to experiment and develop new approaches for the creation, curation, and production of creative arts, and to use digital technologies to become more resilient and efficient.

The genuine willingness to share technologies across the region provides the seeds for potentially new, and shared, approaches that can enhance the audience experience across the sector – whether it is by providing assistive or educational technologies that can be used across venues, for example, automated captioning, scene description, sign language and foreign language translation, or by exploiting new technologies for storytelling and for the creation of art that can be enjoyed within a physical space as much as in virtual reality.

Emerging digital technologies, including novel sensor technologies, artificial intelligence, visualisation, and immersive systems, will enable us to create engaging, inclusive and scalable experiences that are open to everyone and therefore not only provide an economic stimulus to the city region, but help to advance social and educational goals nationally.

We are already seeing the development of several supply chains between small technology companies and larger cultural organisations, which means that the LCR4.0 Holistic programme is likely to leave a lasting legacy for the region.



LCR4.0 Holistic HOLISTIC

LCR4.0 HOLISTIC is a European Regional Development Fund initiative (ERDF), delivering the first Liverpool City Region (LCR) wide digital supply chain ecosystem for SMEs. Cross-linking traditional supply chains and clusters to create a city region supply chain network to offer greater business resilience, growth opportunities and diversification.

Our team of technology and digital specialists will help your business to overcome industry challenges and barriers by improving visibility with analytical insight to enhance productivity, efficiencies, confidence and drive practical and cost-effective solutions.



Virtual Engineering Centre VEC

VEC VIRTUAL ENGINEERING CENTRE

Part of the University of Liverpool, the Virtual Engineering Centre (VEC) is the first UK leading digital engineering centre, supporting industry in its digital transformation.

NORTHERN

POWERHOUSE

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The VEC has over ten years of experience combining world-class research and unique capabilities and experiences of digital adoption to hundreds of businesses across industries and sectors.



FACT is the UK's leading centre for art, film and the creative use of technology. Located in the heart of Liverpool city centre, FACT creates transformative experiences that spark the imagination and enrich lives. Home to three art galleries, four cinema screens and a Studio/Lab for artists, FACT provides platforms and opportunities for people to create, learn, experience and make sense of the world today.

Culture Liverpool

Culture Liverpool leads the development of arts and cultural strategies for Liverpool, contributing to the City Council's aspirations to make Liverpool The UK's Most Exciting City'.

The arts and creativity are vital to Liverpool's regeneration and renaissance as a global cultural city. Liverpool has always had an outstanding cultural offer, the city is rooted in creativity, and it forms part of the city's cultural heritage, attracting tourists and visitors by the millions each year. However, it is essential that the city stays in touch with new digital developments and innovations and that the sector responds to the changing needs of visitors.

"Few would argue against the need to stay up to date, offer something fresh and new, innovate and stay ahead. The cultural sector is renowned for creativity and inventiveness with limited resources, and the ability to develop content that engages, excites, and entertains communities, tourists and visitors alike.

The Sandpit is a unique funded opportunity for the creative arts sector to dip their toes into new innovations and digital tools, to find out how technology can improve their business, the cultural offer of the city, and their audience experiences. Connecting with experts on both sides means that content creators, technical experts and innovators can come together, for skills and knowledge to be shared, new partnerships forged that will have a lasting impact and set out ways to improve existing practice, but maybe also find (or invent) the Next Big Thing!"

- Sean Durney, Arts Development Officer at Liverpool City Council, Culture Liverpool



Thanks

A special thanks to our Digital Creative Arts Sandpit Partners and Collaborators: FACT, Culture Liverpool, The Bluecoat, Liverpool Everyman & Playhouse Theatres, Royal Court Theatre, LIPA, MMA Design & Project Management Ltd, Auditive, DreamStudio, National Festival of Making, Wired Aerial Theatre, Cinema Nation CIC, Sound City, GetRealXR, Garstang Museum, Despite the Monkey, Scenegraph Studios, Focal Studios, Chataway, Melodic Distraction, Murphy's Gin & Y Entertainment

The Opportunity

Digital technologies offer opportunities to make creative businesses more resilient, and competitive, reaching wider audiences, and developing new forms of artistic expression. Many of the enabling technologies can be shared across the creative sector, leading to cross-organisational collaboration.

We aim to raise awareness and improve understanding of innovative digital technologies and showcase best practices for the arts sector. This new initiative will use the LCR4.0 Holistic project to bring together key industry stakeholders to highlight the impact and benefits of innovative technologies that will support the growth of a 'digital arts ecosystem' and supply chain.



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CREATIVE INNOVATION

There is a magnitude of opportunity for SMEs and businesses to utilise creative and innovative technology for developing and improving artistic output.



UTILISING IMMERSIVE TOOLS FOR CREATING COLLABORATIVE EXHIBITION SPACES

With a forever-growing digital ecosystem, all sectors and industries are looking to adapt and diversify products and services to suit the changing environment, match and exceed customer expectations.

The arts and culture sectors are no different, with more organisations looking to focus on greater inclusivity and accessibility than ever before, bringing the virtual and physical together through new innovative supply chains.

Using immersive and collaborative tools, theatres, exhibitions, and creative spaces are being brought to life through projection and tracking systems, immersing audiences into new realms, interacting and communicating in real-time with art and performances. The integration of cloud-based technology takes this to new levels, facilitating live connections between different exhibits and supports new online audiences.

CASE STUDY 01

Aligning physical and virtual exhibitions in real-time

FACT (Film, Art and Creative Technology) is the UK's leading organisation for the support and exhibition of art and film that embraces new technology and explores digital culture. FACT believes in enriching lives and shaping the future through film, art, and creative technology.

FACT wanted to explore how to incorporate Metaverse technology into exhibitions and physical worlds to enable visitors to interact and engage directly with the virtual world. The Virtual Engineering Centre supported FACT in exploring how two-way communication between physical and virtual attendees of an event can be enabled in real-time, using cloud services and real-time tracking to bring physical and virtual users closer together and enhance accessibility.

FACT hopes to use this proof-of-concept of a virtual space to increase collaboration amongst the creative communities within the Liverpool City Region, facilitating growth across the digital supply chain.



This collaboration demonstrates a piece from Primordia (2022), an immersive online work that invites you to explore three worlds inspired by artist Kerolaina Linkevica's research into Goddess worship, and her personal experiences of ancestral belief systems passed through the maternal line of her Latvian ancestors and family.

AMPLIFYING ARTISTIC EXPERIENCES THROUGH CAPTURE TECHNOLOGY

Innovative technologies such as 360° video, ambisonics and state tracking can be utilised for unique performance engagement experiences. These tools can enhance education for a more immersive experience, bringing communities together whilst supporting performances and deliverables.

Digital technologies open incredible new opportunities to create truly unique experiences. By leveraging immersive technologies, viewers can be taken on a journey that allows them to explore new angles and perspectives, within the first-person perspective. Incorporating interactive elements into the experience allows viewers to feel more connected and involved with the content and performance, rather than passively watching a video.

360° technologies could allow creators to better understand the space they are working in and how the audience engages with all available areas through interactive applications such as haptic technology and eye-tracking tools. We can also place people in digital scenes, allowing for pilot performances to offer insight into audience behaviour and better tailor performances to suit the viewer, including various audience requirements, making shows more accessible and inclusive than ever before.



360° video capture technologies for alternative performance experience

Wired Aerial Theatre is an acclaimed aerial theatre company, focusing on inventive bungee-assisted dance whilst exploring how emerging technologies can support new approaches and methodology for bringing aerial techniques to even wider audiences.

The team have used 360° cameras to create an immersive experience, allowing end users to experience their show 'Me vs Me' remotely. This has given Wired Aerial Theatre a new, sustainable, low-cost product to offer to their audiences.

We also explored using light, wearable cameras to develop a 'first person' performer perspective. This demonstrates what it feels like to elevate yourself into new higher surroundings during a performance. These high-resolution videos can be placed within a virtual reality (VR) environment, allowing even more communities the opportunity to see and feel what it is like as an aerial performer and gives Wired Aerial Theatre another resource to use during their workshops with schools.

For ore information, please visit www.wiredaerialtheatre.com or contact: wendy@wiredaerialtheatre.com





SUPPORTING COMMUNITIES AND CULTURE THROUGH INTERACTIVE WEB APPLICATIONS

Web-based tools and data offer a unique opportunity to support and enrich communities and cultures. Through visualizing data and mapping it to specific geographical locations, we can gain a greater understanding of regional cultures and histories.

This understanding can be used to inform decision-makers and provide a holistic view of an area. Additionally, archival film footage, photos, films, and local performances can help to further communicate the richness of a culture.

With open-source tools and community data, we can create powerful digital interfaces to highlight and share the unique stories of a community, past and present.



New ways of delivering performances, education & community engagement

Archive films and photos tell individual stories and can contribute to building a wider picture of the local community in an area or region throughout time.

Cinema Nation is a Merseyside-based research and innovation Community Interest Company that explores, supports, champions, and encourages all forms of film exhibition, especially film archives within community settings. The company wanted to create a locally owned platform to discover how emerging cloud-based technologies can help in collecting, tagging, and sharing thousands of digital content pieces from communities across the Liverpool City Region to tell stories and preserve memories from the past.

Working with Ecosystem2 and a local focus group, Cinema Nation used mapping technologies for pinpointing where photos and videos were captured. Alongside the VEC, the teams developed an interactive dashboard where digital media can be uploaded and shared. This dashboard not only enables individuals to tell their own stories and share past experiences, but forms a wider picture of the city, culture, and historic timeline. These stories can then be used for well-being and educational purposes in addition to bringing communities together in unique storytelling.



DEVELOPING VIRTUAL WORLDS AND EMBRACING THE METAVERSE

Using new technologies, we can create a Metaverse for the creative arts. These virtual worlds can bring audiences and performances closer together, offering an even more accessible platform for those interested in exploring more performances, accessing some of the best facilities and venues across the world and connecting audiences with creators and shows like never before.

The rise of digital technologies has opened up a world of possibilities for people to access experiences that may have been previously difficult or impossible due to physical location, ability or financial restraints.

The ability to experience something virtually is beneficial in many ways, from providing more educational opportunities, to allowing people to connect with a diverse range of cultures and customs. It is an incredibly powerful tool that has the potential to bridge gaps and break down barriers that have traditionally held people back. The growing demand for virtual experiences is a testament to the power of digital technology, and its ability to make Liverpool a more accessible, equitable, and inclusive city. CASE STUDY 04 dreamstudio.ic

Novel approaches to virtual and immersive art exploration

Dreamstudio.io delivers digital creation services since 2017, harnessing immersive and cutting-edge technologies for delivering innovative media experiences and engaging with new audiences. The organisation collaborates with artist practitioners and collectives whose practices include traditional and tangible work in addition to digital and virtual work, using new blended technologies.

Dreamstudio.io is exploring Metaverse-related technologies for encouraging local, national, and global artists to engage with immersive technology and contribute to the wider growth of Digital Arts co-creation across the Liverpool City Region. The collaborative project with the Virtual Engineering Centre and museum partners enables travel between virtual worlds where art can be showcased, co-created and experienced.

Using the Unity game engine, the VEC's experts are exploring potential planning to help DreamStudio.io facilitate a smooth pipeline and implementation, avoiding further time delays. New immersive techniques are helping to pave the way for an improved mixed-reality community for artist collaborations.

As part of the Creative Arts Digital Sandpit 2023, DreamStudio.io presents excerpts from A-Maze Artists Collective work as part of their ongoing virtual and blended creations.

Dreamstudio.io is currently working with VEC to develop the prototype of their interactive virtual artists' world.

This display shows prototypes for their forthcoming exhibition at APT Gallery in London in October 2023.





AUDIENCE ENHANCEMENTS

Audiences are the key to any performance and their needs and satisfaction levels can be further enhanced and better monitored through innovative tools and technology.





CREATING INCLUSIVE EXPERIENCES AND SUPPORTIVE EXHIBITIONS

Inclusivity within the arts is a huge focus moving forward and automated captioning, sign language or audio-description systems can ensure that all audiences can collectively enjoy a performance without the need for scheduling shows for specific dates and times for multiple different audiences, which can alienate and isolate communities and act as a barrier for attendance.

These AI driven tools are helping to shape the future of inclusive and relaxed theatre by enabling disabled, Deaf and neurodiverse people to engage in cultural events and feel part of a wider community with easier accessibility which, in turn, promotes mental well-being.

These techniques can be expanded for beyond the stage, with the possibility of facilities adapting the technology for use in various other ways across a venue, such as wellness rooms or accessibility information points.

CASE STUDY 05

Automated captioning, for supporting Deaf, deafened, hard of hearing & neuro-diverse visitors

With an estimated 12 million people in the UK who are Deaf or suffering from hearing loss and 151,000 people using British Sign Language, Liverpool's Royal Court identified the need for greater inclusivity for these wider communities and groups concerning the performing arts.

Royal Court Liverpool aspires to be the friendliest theatre in the city with key policies focusing on areas of equality, diversity, and inclusion.

The Royal Court worked with the Virtual Engineering Centre to investigate how to develop automated captioning in addition to audio description systems, enabling even more audiences' greater accessibility to performances. Automatic captioning systems can provide a spoken scene narration for visually impaired visitors, ensuring that more communities can easily enjoy shows and performances.

Using similar technologies to existing tools such as Musical Instrument Digital Interface (MIDI), the teams were able to explore how to easily develop systems which can be seamlessly integrated into live performances, using specific and programmed cues for delivering automated captions in addition to visuals for signalling British sign-language.



UTILISING ACCESSIBILITY TOOLS FOR CATERING TO DIVERSE AUDIENCES

Integrating comprehensive tools such as electronic guides, competitive AI tools and virtual training, can improve inclusivity across diverse audiences by offering a more tailored and accommodating service for all.

These systems can enable personal translation, tailored to different cultures and languages, making sure all visitors to your service, regardless of their background, feel included. Additionally, this system could provide resources to help visitors become familiar with the service, further contributing to an inclusive and welcoming experience.



Translational services for considering language rules for improved understanding

More than half of the world's population is bilingual, and it is estimated 36% of the UK population can speak more than one language.

Language and translational experts at Chataway want to use digital tools for enhancing translational services within the creative and performing arts sectors, enabling wider accessibility and inclusivity, going beyond language barriers and restrictions.

Chataway partnered with the VEC teams to begin developing a proof-of-concept using industry 4.0 technologies such as augmented reality (AR) for creating an engaging and interactive application. Holding a smart device over text within exhibitions, for example, will enable the user to translate content into a bespoke and more personal style for translating into several different languages whilst making the content easier to understand, bringing art to a wider audience.

The teams are already investigating how this tool could be expanded and developed further for live performances. Combining other project work across the sector and supply chain, to form real-time captioning of performers and artists, enabling their art to be shared.



IMPROVING AUDIENCE INTERACTION THROUGH ENGAGING INTERNET OF THINGS TECHNOLOGIES

Improving audience interaction is an exciting challenge for galleries, exhibitions, and event organisers. Historically, physical guides and manual human input would often be used to trigger an immersive event, lighting, or audio cue.

By leveraging the latest smart automation technologies such as sensors, proximity technology and Bluetooth, exhibit organisers can pass control to the hands of the audience, creating a more immersive and unique experience. The use of popular and everyday smartphones, existing off-the-shelf tools, and other creative solutions are enabling the creation of interactive experiences that keep audiences engaged but require less manual and mundane input.



Using apps and mobile technology for improved audience participation and interaction

Despite the Monkey uses its combined experience in theatre, live events, technology, and design to tell unique stories in new and innovative ways. At their team's core, they value audience experiences and aim to leave a lasting impression.

Despite the Monkey has collaborated with the VEC in discovering how emerging technology can support the development and delivery of a new and immersive experience for gallery visitors and exhibitions, with an emphasis on spatial sensory. Together the teams explored how wireless technology beacons and geo-fencing can act as a locational trigger, generating and presenting bespoke digital content when a person steps into a specific area. As videos begin to play, audio and lighting are triggered, bringing the space to life and immersing the audience further.

Despite the Monkey is also interested in exploring how they could introduce sensor technology throughout exhibition spaces for gaining a greater understanding of their guest's footprint and customer journeys, identifying busier and more popular areas of their exhibitions, and tailoring their layouts accordingly to ensure that all work is recognised and equally shared.



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REMOTE ENGAGEMENT AND IMMERSIVE ONLINE EXPERIENCES

Online 360° video and audio experiences have seen a rise in use and popularity over recent years, amplified by the COVID-19 pandemic limiting access to in-person events.

Since the pandemic, immersive online experiences have continued to be used and have improved in quality in line with increased adoption. 360° content can help bring those who are unable to visit an in-person event into a virtual recording or live stream of the experience.

A common problem when capturing content in 360° formats is that the quality of the 3D directional audio usually does not meet that level of the immersive 360° visuals. This problem is recently being addressed through ambisonic audio recording techniques, ensuring the audio experience correctly reflects the standing position the audience would have if they attended the physical event.



Novel approaches to production delivery for a realistic experience

Sound City is the UK's leading independent festival and conference for new music in the heart of Liverpool where the best musical discoveries lie. The organisation are also the UK lead for Keychange, an initiative whereby the teams pledge to achieve gender balance across their festival and conference line-ups.

Sound City highlights and promotes local artists and performers across Liverpool, showcasing new and exciting work through large-scale music events and festivals whilst offering creatives the opportunity for development through training initiatives which can lead to greater career opportunities.

The teams were keen to discover how ambisonic audio techniques could be used to enhance 360° video performances and create a greater sense of immersion for remote viewers. This collaboration aims to identify how technology can improve the capture and broadcasting of live music, shows and performances.

In addition to improved auditory immersion, the assist will further support a holistic experience for those communities with accessibility concerns and disabilities. Events will be accessible through virtual reality (VR) technology, immersing remote audiences into an event venue whilst unlocking audio sensors for a realistic experience.



ENGAGING STORYTELLING THROUGH AVATAR AND METAHUMAN TECHNOLOGY

Innovative new methods have helped to pave the way for bringing significant figures to life.

Utilising digital technologies such as photogrammetry, AI, image detection and mesh generation, a life-like virtual character can be created which opens up opportunities for organisations to engage with tools and performers. Having a virtual character provides more flexibility for public interaction and can further support engagement.

How AI can be a medium for conversing with virtual characters

Through an exciting combination of performing arts, digital capture and processing technology, St George's Hall and the Virtual Engineering Centre has produced a responsive virtual avatar proof of concept. Through innovative new methods, this partnership has helped to pave the way for bringing significant historical figures to life.

Utilising digital technologies such as photogrammetry, AI, image detection and mesh generation, a life-like virtual character can be created which opens opportunities for organisations to engage with tools and performers. Having a

virtual character provides more flexibility for public interaction and can further support engagement.

By combining the use of a virtual avatar and facial tracking technology, a performance can be integrated with the virtual world, through a recorded session or demonstrated through real-time live tracking for a more dynamic result.



Augmented Reality avatar brings the story of Murphy's Gin to life

Murphy's Gin is a family business producing small batch, naturally flavoured, award-winning gins, in the heart of Liverpool's historic North docklands.

Like many Liverpool natives, their ancestry can be traced back to Ireland. William Murphy, a young mariner, left Wexford harbour for Liverpool in 1889, dreaming of a better life. Shortly after arriving in one of the greatest maritime cities on earth, he met his future wife, Bridget Murphy, also from Wexford. Settling in the Scotland Road area of Liverpool, they soon married and had seven children. Fast forward four generations later and three brothers have embarked on a different type of journey with Murphy's Gin.

With support from the VEC, Murphy's Gin focusses on the creation of an 'augmented reality' avatar. Using AR technologies, placing a smart device toward the company logo positioned on the companies bottles, will enable a virtual character to appear, explaining the history and origin of the brand.

The underlying technology is also directly useful for applications within the creative arts where 'story telling' can make artworks and spaces accessible to visitors of all ages and abilities.



AUDIENCE AND ARTIST INTERACTION THROUGH COMPUTER VISION TECHNOLOGY

Computer vision technology can provide a powerful platform for audience and artist interaction. This technology can create unique interactive experiences by blending physical buildings, dynamic projection systems, and camera tracking tools.

It can also combine computer vision tools with the architecture of significant cultural spaces, allowing for more immersive experiences than before.

Computer vision and mixed reality technologies can also be used to unify creators and immersive media specialists, allowing them to produce stunning visual stories which can be controlled through human input.

Additionally, computer vision can enable human interaction with large-scale outdoor display systems, using off-the-shelf tools or depth camera technology. Ultimately, computer vision can be a powerful tool to bridge the gap between audience and artist interaction.



Creating new human-interaction media systems on novel surfaces using projection mapping

Focal Studios are a multidisciplinary Audio-visual Design and Technology Studio offering turnkey solutions in Projection Mapping, Immersive Media, Video Production, Visual Arts, Creative and Technical Consulting.

They deliver remarkable end to end designs and installation solutions to any specification, built with their creative and technical expertise, exceeding client's expectations and leaving audiences amazed.

Focal Studios have extensive experience in creating powerful, engaging visual stories, having worked on many third-sector, marketing and corporate communication projects for local councils, businesses and arts organisations. Their capabilities include creating bespoke, site specific projection systems, immersive installations, professional video services and animation, extended reality media, sculptures and spectacular outdoor projection events.

Focal Studios understand the importance of creating compelling long and short-form content that not only resonates with audiences but drives results through any digital platform or format. Many of their clients include heritage museums, visitor attractions and discovery centres, so one of the potential growth areas the company identified was immersive storytelling through user-interactive projection.

The VEC team have collaborated with Focal Studios on an exciting project to explore new ways to bring their projection-based content to life. Through LCR Holistic, Focal Studio's projectionists will be exposed to potential avenues of further digital adoption, focussing on how audiences may interact with their ground-breaking media.



"Imagine a world in which every surface and object becomes a magical storytelling device, brought to life through immersive technology."

Dennis Outten, Managing Director



OPERATIONS MANAGEMENT

It is critical that creative organisations equip themselves with innovative and efficient digital tools to help them manage their operations efficiently.



ASSET DIGITISATION AND TRACKING OF PROPS, COSTUMES AND EQUIPMENT

Smart tagging technology enables real world products/items to be connected to the digital world and consume digital data. NFC, RFID or QR code smart tags can search, identify, track, and communicate with items, smartphones and people.

Theatres can use and own hundreds and hundreds of items of clothing and props for shows and performances. Smart tags enable groups and organisations to easily track and trace inventory across multiple facilities and locations, ensuring assets are securely stored, encouraging multiple uses, and reducing waste and further unnecessary purchases.



Creating automated systems (smart tags) for asset tracking and security of inventory

Liverpool Everyman & Playhouse Theatres wanted to explore how digital tools could improve this cataloguing process to ensure items are correctly logged and tracked in real-time.

Working alongside the VEC, the teams began developing an app to support the tracking and logging of multiple assets at one time using individual barcodes. This app features detailed information, including keywords for identifying and searching without tracking or asset numbers, descriptions, images, which performances these have been used for, and where they were currently being used or stored.

In addition to tracking physical items, using light hand-held scanning technology, Everyman Theatre can create a virtual copy of each asset as they build a digital catalogue. This digitalisation process creates a realistic view of each item, which can often look distorted in archived photos. 3D scans offer significant detail whilst being interactive so users can revolve objects around for more detail, should they be searching for specific items, props, or defects.

This digitisation and recording process aims to replace pre-existing physical alternatives, improving understanding and tracking of otherwise undocumented assets. The tool can also contribute to the circular economy and resource sharing across city region arts community. The proof-of-concept tool has been produced specifically with the Creative Arts community in mind, meaning that the functionality is relevant and applicable to various organisations across the supply chain.





CREATIVE ARTS DIGITAL SANDPIT

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SCANNING TECHNOLOGY AND FACILITY MODELLING

Scanning, visualisation, and acoustic modelling technology can enhance facility planning activities, catering to the needs of a wider potential visitor audience with various needs.

Realistic digital environments can be created for educational purposes whilst enabling stakeholders and potential customers the opportunity to virtually explore remote venues from across the world, bringing performances to life for a uniquely remote and immersive experience.

LiDAR scanning can quickly and easily capture accurate measurements and rapid digital model generation, fast-tracking planning and decision making despite geographical location whilst architectural visualisation can be paired with visualisation tools such as virtual reality (VR) for enabling users to view a space in real scale.

Lastly, acoustic modelling from the LiDAR and 3D architectural models can help to generate a realistic auditory model of the environment, enabling organisers to gain a real understanding of how the audience will engage with a performance and space, learning more about the customer journey and understanding how their experience will be.

This understanding will truly benefit when planning for an array of communities with a variety of differing needs, such as neurodiverse audiences. Modelling of these environments can support assessing footfall, identifying problematic areas for specific sensitivities, and improving planning for these areas to remove louder elements or variables which could cause discomfort in any way.



Creative Adaption and Virtual Construction of Creative Arts Spaces

The Liverpool Institute for Performing Arts (LIPA) is a performing arts higher education institution based in the heart of Liverpool. Based across two Grade II listed buildings, the LIPA facilities offers guests access to world-class equipment and apparatus that support and nurture creativity and skills development.

As part of their inclusivity mission, LIPA recognised that an open and connecting space between two areas of their building was unhospitable as the area was loud with echoing noises. These concerns could create barriers to inclusivity amongst their guests.

LIPA invited local architect Maggie Mullan from MMA Design & Project Management Ltd to explore how the space could be re-designed and transformed for improved accessibility. Ian Etchells of Auditive Limited also joined this process, using spatial measurements to investigate how sound travels and echoes and how to minimise these disruptions for a more soothing and calmer environment.

Lastly, the Virtual Engineering Centre (VEC) used scanning technologies to capture accurate measurements and details of the area, using this data, simulation technology and virtual reality (VR) to build an interactive and immersive virtual model. The digital tool allows users to realistically experience the space without causing stress, supporting testing within a comfortable area. Subjects can then offer honest and valuable feedback that can better inform LIPA and their design team of proposed changes that would work, providing greater confidence in their decision-making for developing a more inclusive and accessible space for all.



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DIGITAL TWIN TECHNOLOGY WITH REAL-TIME DATA INTEGRATION

Digital twin technology can enhance facility planning, supporting remote engagement for internal teams and members of the public and allows layout monitoring for footfall planning.

A digital twin will allow event organisers and facility managers to better plan and forecast issues ahead of an event or performance, finding easy solutions for a more prepared response. This can increase the safety of audiences and visitors, whilst ensuring the facilities are utilised to the fullest.

In addition, using building sensors and Computer vision technology we can generate and collect real-time data on the facilities themselves including weather conditions, temperature and even air quality. This can support the management of facilities to ensure it is safe and comfortable for all visitors.

In turn, this can also support the sustainability of operations and ensure financial resources are being spent efficiently or used where needed for example. These sensors can also actively monitor visitors and people within the space, showing popular areas which could suggest future damage through higher uses and visitor numbers, supporting maintenance teams for awareness and planning.



Area scanning and 'Digital Twin' technology to help with facilities monitoring, gallery planning and improvement.

The Bluecoat is Liverpool's contemporary arts centre, a working home for artists, and a place where audiences can experience art in new ways.

The Bluecoat was interested in exploring how emerging tools can be used for developing a digital twin of their space, and how this could be used for developing a greater understanding of the space in which they could improve audience engagement and potential costs.

Using LiDAR and Matterport scanning technology, the VEC teams scanned the entirety of the Bluecoat facility, developing a detailed and accurate digital copy of the space.

Bluecoat believes this will support future innovations, gaining a real understanding of how their audiences experience this space and identifying how this can be improved. The teams are also using this new data and digital twin metrics to better understand their energy consumption rates, assessing this data for temperature, lights, and humidity which the teams believe will be able to feed into their energy-saving plans, reducing costs and their carbon footprint.



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BUSINESS OPPORTUNITIES

Business Opportunities focuses on the capture and use of valuable data for informing new strategic directions and diversification to increase revenue.



DATA ANALYTICS FOR CREATIVE ARTS

Venue management teams can utilise a variety of data mining techniques to assist with decision-making.

By working with various data sources, including IoT streaming data, ERP systems, and Google Analytics, teams can gain insights for identifying audience segments and monitor user browsing behaviour to improve the overall experience of their services, designs and venue.

These insights could highlight the types of music a specific audience segment prefers or even which areas are popular within a venue. Management teams can therefore make data-driven decisions to improve and tailor the overall experience.

Al models can be used to track objects, identify unusual usage patterns and predict activities through data analytics and machine learning. Creative Arts organisations are taking advantage of these technologies, to unlock the value in their data and to use those insights to drive improvements.

Algorithms can be created and used to understand data and visualise scenarios to support events planning, analysis, visitor economy and control environmental impact.



Collating open-source data analytics for planning, audience analytics and event advertising

Melodic Distraction is an independent community-based radio station based in Liverpool celebrating the sounds and stories of Liverpool.

The company is home to 250 radio presenters and hosts thousands of listeners a month in addition to an online magazine and physical space where the musical communities of the North West can come together, perform, and express themselves.

Melodic Distraction's goal is to support North West culture at every turn. One way they are now achieving this is through a physical "tap pad" system. By tapping a smartphone onto a pad, placed on the counters at independent music and cultural businesses across the North West, users can view useful information about that business such as offers, upcoming events and news updates. These pads harness the same NFC technology used by contactless payments such as Apple and Google Pay.

The radio station was keen to learn more about how they can extract and utilise a magnitude of different data sources for better-supporting art organisations. The Virtual Engineering Centre studied several open-source data collection plans which would enable the teams to collectively find and use a thorough data pipeline, collating data from google analytics in addition to their multiple locations information and pulling this together for an internal dashboard for concisely communicating this data.

This dashboard is locally hosted, giving Melodic Distraction full control over the data being collected and how it is demonstrated for supporting decision-making when it comes to advertising and customer journeys, ensuring they and their partners are reaching their targeted audiences and using the correct methodologies and pathways in doing so. In all, this system allows Liverpool's cultural economy to be more engaged and in-tune with its audiences.



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TRACKING AUDIENCE ENGAGEMENT THROUGH INTERACTIVE APPLICATION PLATFORMS

Virtual and Augmented Reality applications are increasingly used for learning, safety or inclusivity training, but also for medical interventions such as mindfulness, well-being, pain relief or physical rehabilitation.

One of the key advantages of immersive learning and rehabilitation tools is that users can use them anywhere and at any time.

For many applications, for example, where immersive technologies are used for compulsory training components, like safety or inclusivity training in commercial contexts, for learning in educational contexts or for rehabilitation, it is essential to monitor user engagement centrally.

Being able to capture user experience also enables developers to continuously improve their products.

If engagement and performance is monitored, this data can be used to further enhance user experience and learning output by providing feedback to users, for example showing users of rehabilitative systems how the intervention improves performance.



Analysis of User Interactions with Virtual Applications

Scenegraph Studios are a multidisciplinary creative studio. They help companies with their immersive strategies to engage clients, drive sales, and increase brand awareness. Specialising in virtual reality, augmented reality, 3D modelling, and 3D web.

Scenegraph Studios caters for a wide range of sectors, delivering bespoke visualisation solutions to solve diverse problems. They specialise in developing Virtual Reality experiences, predominantly using Unreal Engine and Meta Quest 2.

The team are dedicated to using VR and technology for good and pride themselves on delivering solutions to immersive tasks, bridging the gap between artists, performers and corporate clients.

Their flagship product, Spirit VR, is an interactive collection of experiences designed to help people with a variety of common mental wellbeing issues. These include mindfulness exercises, anxiety reducing scenarios and interactive sensory rooms. Scenegraph Studios were particularly interested in how they could better track individual and group engagement with this application, and some of the many VR-based software they develop.

Allowing them to build analytical visualisations from the results in order to produce whitepapers to reinforce the validity and effectiveness of their applications.

The VEC is supporting Scenegraph Studios to develop principled, subjective, and objective user engagement metrics and represent these on web-based accessible dashboards. The support through the LCR Holistic project aims to help grow existing and future applications, so that Scenegraph and their clients can gain further insight and understanding into how a user interacts with the virtual environments.



FOSTERING GREATER PROFITABILITY AND CREATIVE ARTS INVESTMENT

These popular and emerging phrases are commonly used but can offer real opportunities for generating greater interest and even additional income for businesses across multiple sectors and industries, particularly through the creative arts.

Linked with crypto, non-fungible tokens (NFTs) are digital artefacts or stamps of real-world assets including art, costumes, performances and even shows. These are all digitally created, stored, and sold. Assets based on costumes, for example, can be created in limited numbers which can generate further interest through being unique commodities. NFTs can also be used as digital tickets, allowing a much more secure and robust smart contract-based ticketing system.

This technology not only opens new financial benefits, but can help to create a digital footprint, collection of shows and art collections, whilst also enabling your work to reach even more audiences from across the globe, encouraging investment and preservation.



Alternative revenue through digital technologies such as Blockchain & NFTs

Y Entertainment is a premier boutique marketing company specializing in servicing various brands within creative industries, especially high-end luxury ones.

Their focus is on helping companies create experiences that elevate brand reputations by identifying and engaging with very unique audiences.

Understanding the growing potential of Blockchain technology, Y Entertainment was keen to discover how the high-end brands they work with, along with the creative artists, could utilize the technology and create NFTs for their work. This would diversify the way they generate income and engage with their consumers.

The VEC has already explored these new themes over the past couple of years, most notably by creating a Digital Heritage Digital Asset (NFT) proof-of-concept portal in collaboration with St. George's Hall Liverpool.

Blockchain technology is rapidly becoming a usable tool across various sectors and supply chains. It is a new, secure, and improved way of handling, tracing, and collaborating with physical assets and digital data.

Furthermore, it is possible to foster greater profitability and investment through blockchain-enabled fractional ownership of non-tangible, digital assets, including non-fungible tokens (NFTs). The city region can work together to create an investment community of collectors, promoting specific assets across the region to encourage engagement, while financially building a profile through well-publicized launches.

The VEC supported Y Entertainment by using their expert knowledge and experience in blockchain technologies to develop proof-of-concept demonstrators. They also offered knowledge transfer opportunities for their teams to gain a greater understanding of the technology, ensuring they could communicate the benefits of the technology more effectively to their customers. This would enable Y Entertainment to diversify into new markets and sectors, bringing an array of new opportunities to their businesses.



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