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Research

Mapping and research into arts and technology in Hong Kong, Japan and South Korea

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Contents

Executive summary

Advances in technology have enabled the development of new modes of creative expression, production and consumption. With these advances come new opportunities for cultural exchange. Arts and technology projects are often complex and highly collaborative, requiring multi-disciplinary teams and range of skills and expertise.

Hong Kong, Japan and South Korea are home to rich, diverse and dynamic arts and technology ecosystems. In all three countries and territories, digital innovation in the arts is a government policy priority, leading to continued development of new programmes, infrastructure and R&D.

As part of this, efforts are being made to extend and deepen the sectors' international connections, included those already established with artists, creative businesses, research institutions and cultural organisations in the UK. This is therefore an opportune time for the arts and technology sector in the UK to collaborate more closely with their counterparts in Hong Kong, Japan, and South Korea.

This research, commissioned by the British Council and undertaken by BOP Consulting, seeks to support future partnerships and exchange by offering insight into the key trends and characteristics of the arts and technology sectors in each country and territory.

Hong Kong

The arts and technology sector in Hong Kong is developing rapidly and has been prioritised in government policy since 2020. This has spurred a wave of investment and initiatives to grow Hong Kong's infrastructure, capacity, and talent base in 'Arts Tech'.

These efforts are part of Hong Kong's move towards a more outward-looking, integrated cultural and creative industries (CCIs) policy, which seeks to capitalise on the city's status as a global trading hub.

A distinctive feature of Hong Kong's Arts Tech sector support environment is the city's public engagement programmes, such as the Arts Tech Lab and Public Education programme run by Hong Kong Polytechnic University. Such initiatives target school students and communities, engaging them in the production of projects and building future audiences and talent.

A key part of the sector's development, led by the Hong Kong government, is the East Kowloon Cultural Centre, a state-of-the-art cultural venue which is hoped will go some way to address a lack of venues and facilities in which Hong Kong creators can produce arts and technology projects. The venue will host four performance spaces and will accompany government initiatives to stimulate the use of technology across Hong Kong's major performing arts groups, which have so far been slower to adopt digital innovation than Hong Kong's vibrant network of sonic and visual artists pioneering new modes of creation.

Many of these artists and practitioners have existing links to the UK, either as alumni of the UK's leading art and design colleges or through relationships with the UK's galleries and cultural institutions. These connections provide a solid basis for further UK-Hong Kong cultural exchange during an exciting period of growth and development for the city's arts and technology sector.

Japan

The arts and technology ecology in Japan has evolved through a dynamic mix of public, private and third sector efforts.

Japan is home to global leaders in electronics manufacturing and telecommunications alongside leading-edge research laboratories, who drive the country's rich R&D base.

Up until recently, innovation and growth in the digital industries has been achieved through business-led investment and R&D, with relatively little need for government support. However, given its importance it has now become more of a priority area for the Agency for Cultural Affairs and for the Ministry of Economy, Trade and Industries, who recently established a working group on Arts and Technology.

New tools and technologies being developed in Japan are becoming increasingly integrated into the country's well-established content pipeline, offering new ways to create and consume cultural works. For example, Japanese musicians and sonic artists have pioneered modes of musical production and performance using artificial intelligence, while advances in biotechnology have spurred significant interest and activity at the intersection of arts, science and the natural world, known as 'bioarts'. Much of this work is at the forefront of global scientific understanding and is prompting artists to ask fundamental questions through their work about what it means to be human.

Researchers are also exploring the potential of these technologies to improve access to artistic works and creation for people with disabilities, through initiatives such as the xDiversity programme. This represents a key opportunity for practitioners, organisations and policymakers working towards the same accessibility goals in the UK.

Japan is also home to a vibrant and growing international arts and technology festival and events scene, providing important platforms for UK-Japan exchange. This includes the Osaka World Expo in 2025, which has a focus on digital creativity and innovation.

South Korea

South Korea's creative industries have undergone rapid growth over the past decade, underpinned by a long-term national strategy to transition into a 'creative economy' and high level of public and private investment at national and city level.

Arts and technology have been at the forefront of this strategy. In 2020, the Korean government launched its Digital New Deal for promoting the creative and digital industries, focusing on structural reform of the sector to enhance its global competitiveness.

A similar initiative in Seoul, the Metropolitan Government's Digital Culture City Plan, focuses on the digitization of the city's cultural infrastructure to improve accessibility and visitor experience.

As a result, there is a rich and fast-developing arts and technology ecosystem in South Korea, with internationally connected venues, artists and festivals, with significant opportunity for UK-South Korea collaboration.

This includes **Art Korea Lab,** a major new arts tech venue and studio space opening in October with an international symposium, and the newly established **Unfold X festiva**l, which showcases Korean arts and technology, and provides a platform for international work.

1. Introduction

1.1 This research

BOP Consulting was commissioned by the British Council to undertake a mapping and research exercise to gain insight into the current state of art and technology sectors in Hong Kong, Japan, South Korea.

This findings in this report will be used by the British Council to provide market insight and research findings to the UK sector and identify how best to support professional and creative exchange and accelerate connections between these countries/territories and the UK in the arts and technology sector.

1.2 Methodology

Research was conducted between February and April 2023 by a team of UK-based and in-country researchers. The research methodology was as follows:

- Development of workplan defining key terms and project scope

- Lead development interviews with sector leaders in each country

- Desk research led by locally based researchers

- Qualitative interviews to develop deep dive case studies

This report presents the findings of the research for each country, with a concluding chapter which outlines trends and opportunities.

Findings should not be considered an exhaustive catalogue of individuals, organisations and activity related to arts and technology. Instead, this report has identified key developments in each country and explored their implications for UK collaboration and exchange.

1.3 Definition of terms

This research examines trends and activity at the intersection of arts and technology. This activity covers a wide range of artistic forms and practices (visual arts, mixed media, sonic art, design, performing arts etc) and technologies used as part of the creative or presentation process, including artificial intelligence, virtual production, projection mapping, robotics, extended reality (XR) and more.

As such it overlaps with, and draws upon, broader creative industries sub-sectors such as film and television, music, interactive entertainment and gaming.

Artists themselves will work within and across these sectors, undertaking projects that can vary widely in terms of their artistic or commercial focus, the type of commissioner or client and the intended audience. Cultural industries that were previously separate due to analogue systems of production are now converging in digital formats.

This complexity can make definitions and categorisation problematic. Terminology used to describe this activity varies in different organisations, contexts or countries.

UNESCO employs the term '**digital creativity**' to refer to and monitor competencies in new (digitized) models of creative production, while the British Council refers to '**digital innovation**' in the arts. Arts Council England, however, does not generally use the term 'digital arts' – the organisations it funds undertaking work of this nature come under the more general heading of '**combined arts**'.

In Hong Kong, the terms **'Art Tech'** and '**Arts Tech**' are widely, and interchangeably, used in government policy and by the city's institutions – although some Hong Kong artists have questioned whether this implies an inherent prioritisation of the 'tech' above the art.[1]

The term '**Media arts**' is frequently used in Japan to describe artistic and cultural products produced using digital technologies, including by the country's Agency for Cultural Affairs, although the use of this term can also cover mange, anime and other forms of animation that do not use advanced technologies.

In South Korea, policy initiatives refer both to '**digital culture**' and '**arts and technology**'.

This complexity should not obscure the fact that there are an ever-increasing number of artists globally who are skilled and experienced in using technology as part of their practice. This growing body of practice is also reflected in the numerous universities and specialist art colleges which now offer under-graduate or masters degrees in a range of digital arts disciplines.

In the course of this report the following terms are used, all of which relate to the wider field of arts and technology:

Artificial Intelligence: computer systems that aim to perform tasks associated with human intelligence, such as visual perception, speech recognition, decision-making.

Augmented reality (AR): a technology that superimposes a computer-generated image on a user's view of the real world.

Bioart: artistic practice that uses scientific methods and techniques to explore the relationship between humans and living organisms. It often incorporates advanced technologies used to measure and track biological processes and data.

Extended reality (XR): an umbrella term that encompasses all the immersive technologies.

Generative art: an artistic practice in which the artist creates a process (such as a set of rules, or computer program) which is then set into motion with some degree of autonomy, and usually also an element chance, resulting in an original work of art.

Haptics: the use of technology that stimulates the senses of touch and motion, especially to reproduce in remote operation or computer simulation the sensations that would be felt by a user interacting directly with physical objects.

Immersive technologies: ways of creating, displaying and interacting with applications, content and experiences, transforming the digital experience by bringing together the virtual with users' sight, sound, and touch.

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[1] https://www.marieclaire.com.hk/art-tech-keith-lam/

Metaverse: A shared virtual-reality space in which users interact within a computer-generated environment and with other users.

Mixed reality (MR): a medium consisting of immersive computer-generated environments in which elements of a physical and virtual environment are combined.

Projection mapping: techniques for turning complex, irregularly shaped objects such as buildings or landscapes into display surfaces for video projection.

Virtual production (VP): a range of visualisation methods and computer-aided production processes, which are usually drawn from video game engines and performance capture systems.

Virtual reality (VR): the computer-generated simulation of a three-dimensional image or environment that can be interacted with in a seemingly real way by a person using special equipment, such as a virtual reality headset, gloves fitted with sensors, or a full body haptics suit.

2. UK arts and technology landscape overview

2.1 Creative and digital industries

The UK's creative industries are a well-known economic success story, and in recent years have continued to demonstrate strong growth. According to the most recent official figures, the sector has a turnover of £116bn and accounts for 2.2 million jobs, while over the course of the last decade it has grown at roughly twice the rate of the UK economy as a whole.

Over this period, earnings from exports also expanded, with creative industries services exports worth £38bn in 2019[2]. Japan in particular is an important market for UK creative exporters – to coincide with the 2019 visit to the UK of Japanese Prime Minister, the DCMS publicised the size of the market and especially the popularity in Japan for UK-produced film, music and video games.[3]

A significant element of this economic growth has come at the intersection of the creative industries and digital economy. The 'software and computer services' sub-sector is the largest sub-sector of the creative industries and accounted for more than half of all growth in the creative industries between 2010 and 2019.[4]

More than this, within creative sub-sectors such as film, television and music much of the investment and growth has come from the uptake of new digital tools and platforms, transforming methods of production and distribution. According to the most recent annual sales figures from the BPI, the sustained growth in the UK music industry over the last decade has largely been driven by online streaming revenues, which increased by more 6% in 2022 and now account for two thirds of all industry earnings[5].

At the global level, the new digital distributors of creative content, such as Amazon and Apple, are themselves becoming major funders and commissioners, with the UK enjoying a well-documented production boom – according to the British Film Commission[6], inward investment in film and television production is at record levels, and was in excess of £5.3 bn in 2022.

In recognition of the contribution and potential of the UK's creative industries, in June 2023 the UK Government announced a £77m sector deal to boost growth and support innovation. The funding includes significant support for creative R&D and virtual production through the CoSTAR and Creative Industries Clusters programmes, ultimately driving innovation and making the UK a more attractive partner for international collaborations.

2.2 Arts and technology centres

Across the UK, arts centres are providing dedicated space and resources for the creation, production and exhibition of digital art projects and installations.

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[2] All figures are from DCMS: https://www.gov.uk/government/statistics/dcms-sectors-economic-estimates-2019-trade-in-services/dcms-sectors-economic-estimates-2019-trade-in-services

[3] https://www.gov.uk/government/news/uks-creative-industries-thrive-in-japan

[4] https://www.thecreativeindustries.co.uk/facts-figures/createch-headline-statistics

[5] https://www.bpi.co.uk/news-analysis/uk-recorded-music-revenues-rise-for-an-eighth-successive-year-in-2022/#:~:text=The%20BPI%2C%20the%20representative%20voice,for%20the%20full%2Dyear%202022.

[6] https://britishfilmcommission.org.uk/uk-inward-investment-film-and-high-end-tv-production-spend-reaches-record-figure-of-5-37-billion-in-2022/

An increasing number of these are represented in the 800+ organisations that are designated as NPOs by Arts Council England and so receive core funding. They are an essential element of the UK's digital arts landscape and a principal means by which established artists, film makers and producers are able to develop their practice with new technologies and produce and present their work, while also providing support for emerging artists.

Many of these centres cover a range of functions and art forms and cannot be easily categorised or comprehensively mapped. The short table below is little more than a sample but gives a sense of how such centres can be found across the UK, and the nature of their activities. What's more, there are many other cultural organisations who are not venue-based that also have significant knowledge and expertise in this field.

Almost all of the centres receive Arts Council England funding and are 'arts centres' that undertake, to varying degrees, commissioning and production, education, talent development and exhibition and presentation.

Name	Location	Description	Illustrative International Work
B3 Media	Lambeth, London	Talent development programmes, labs and exhibitions to help diverse artists, writers and filmmakers break into the digital arts.	In 2016, B3 was a partner in the Gambiarra Lab, bringing together a group of digital artists from the UK and Brazil to create multimedia works in Rio.
FACT	Liverpool	Production studio, exhibition venue and commissioner for film, new media and digital art.	FACT runs an international programme of exhibitions and collaborations, with a recent season of events themed around East and South East Asian culture.
Factory (opened June 2023)	Manchester	Programmes focus on international collaboration and new cross disciplinary commissions, many projects have arts and technology embedded	Programme will start in summer 2023
Lighthouse	Brighton	Lighthouse runs talent development programmes around arts and technology and commissions artists to make and present new digital work.	In 2018 it was funded by the British Council to develop Arte Sonica Amplificada, a programme addressing the underrepresentation of women in the sound and music industries in Brazil.

MadLab	Founded in Manchester and developing a 'creative campus' in Stockport	A 'grassroots innovation organisation' with a focus on arts, culture and technology. Provides skills and creative production programmes.	MadLab undertook a study tour in Malaysia as part of the British Council's Creative Hubs for Good programme
QUAD	Derby, East Midlands	A centre for contemporary art and film, focusing on artistic practice and exhibition and the creative use of emergent digital technologies.	Presented in 2018 the UK showing of the installation *Line Segments Space* by Seoul-based artist and technology duo Kimchi and Chip
Watershed Arts	Bristol, South West	A centre for film culture, art and technology practice. Its Pervasive Media Studio is a well-established creative lab for artists, technologists, start-ups, researchers and urban planners.	Has participated in a number of British Council programmes, and with BC support launched its Playable City project in Tokyo.
XR Stories	York	Based out of York University, it runs a programme of commissioning, R&D and business support around immersive storytelling and digital arts.	Digital artworks produced by XR Stories have been showcased at SXSW and European events and festivals.
Cultvr Cymru	Cardiff	CULTVR Lab is Europe's first immersive cross-disciplinary space with a strong focus on digital arts, live performance and 360º cinema.	Took part in SXWS, IMERSA Montreal and has participated in British Council projects with Zimbabwe and Indonesia.

Alongside such arts and technology centres, there are a number of centres for virtual production around the country. Virtual production (VP) is a complex term that refers to a range of visualisation methods and computer-aided production processes, which are usually drawn from video game engines and performance capture systems, and which are bringing together creative development, pre-production, production, and post-production. Such centres have been described as 'advanced creative production facilities' and often provide commercial studio services to film, television and other industries.

However, many of them are also rooted in universities and will undertake R&D activities, run education and training programmes and develop new creative projects. This includes large, mainstream universities as well as specialist arts institutions, such as the Royal Northern

College of Music which is home to PRiSM, a research centre working across music and fields such as mathematics and artificial intelligence. A recent, as yet unpublished, study commissioned by Loughborough University as part of the AHRC's Convergent Screen Technologies And performance in Realtime (CoSTAR) programme has mapped out what it calls the UK's 'virtual production ecosystem'. This has identified more than sixty such centres around the country, with the distribution broadly mapping onto that of the creative industries, with a predominance in London and the South East, followed by the North West and Yorkshire regions.

2.3 Digital arts funding programmes

As digital arts have grown across the country, so there has been a commensurate increase in commissioning and funding. In 2016, Arts Council England and Nesta jointly ran the Digital Arts & Culture Accelerator programme of training and mentorship for small businesses. This followed on from the digital R&D Fund in 2015, which enabled them to leverage a research institution and a technology development firm to explore scalable products which could provide a commercial revenue stream to these charitable businesses.

Following on from this, Innovate UK and Arts Council England jointly funded and oversaw the Arts and Technology Pilot Programme. This was a year-long programme of activities and experimental funding for a number of arts-led R&D projects, which aimed to deliver on Innovate UK's Creative Industries Strategy, which recognised that "innovation in the creative industries is driven by an intricate relationship between content and technology; the collaboration between artist and scientist".

2.4 Immersive experiences and VR/AR technologies

Over the last three years, there has been major investment in creative-led R&D and innovative forms of digital origination, production and distribution. Within this, there has been a particular focus on immersive experiences – that is, a range of technologies and production methods that create computer-generated content and environments that users can interact with, giving them the sensation of being in a virtual world. It covers a range of experiences, from virtual reality (VR) through to various forms of augmented reality (AR) depending on the level and type of immersion.

This funding, which was overseen by UKRI under the auspices of the Industrial Strategy Challenge Fund, was allocated through Innovate UK's Audience of the Future programme. This covered a number of different competitions and funding mechanisms, ranging from large-scale demonstrators that were undertaken by consortiums involving national cultural institutions, through to projects that were closer to market, led by businesses and which directly led to prototypes and new creative products.

Alongside the R&D funding itself, there has been a substantial programme of business development and promotion, with international showcasing opportunities. While these were obviously limited during the Covid-19 pandemic, during the last twelve months there have been visits to major international festivals and events, such as SXSW, as well as trade visits. Primarily showcasing vehicles, these also encompass knowledge exchange, network building and initiation of R&D collaborations.

Much of this is brought together under the Beyond banner, which with support from UKRI has since 2019 run an annual conference for creative producers, artists and researchers, with a focus on creative R&D and innovation in immersive technologies and other forms of creative production.

As a result of this activity, there are now a number of cultural institutions, creative businesses and arts practitioners with experience and high levels of expertise in creative R&D, and the development of new forms of creative experiences. The 2022 Immersive Economy Report[7], produced by Immerse UK and funded through Audience of the Future outlined the growth of businesses and researchers working in immersive technologies such as VR and AR.

The report estimated that there are now 2100 specialist immersive companies in the UK, a growth of more than 80% over the last five years. The report has a strong economic focus, and so is primarily concerned with how companies are applying immersive technologies and skills in sectors such as transport, education and manufacturing.

However, it notes the opportunities that such technologies are providing for artists with backgrounds and expertise in other, more established forms of media, to create new kinds of experience for audiences.

2.5 Creative international exchange: UK and Asia

There has been considerable interest from the UK side in fostering cultural, trade and research links in Asia. As shown in even the cursory table above, many of the digital arts centres around the UK have already been involved in arts exchange programmes in East and Southeast Asia, and have a history of working with the British Council.

From 2019-20, UK in JAPAN - a joint initiative by the British Council and the British Embassy Tokyo - highlighted and supported UK collaborations with Japan, including sessions on the the future of arts and technology, taking place virtually and at SXSW.

Alongside this, in recent years, immersive media technologies have been a particular focus for the Global Expert Missions programme. Managed by the KTN on behalf of Innovate UK, GEM aims to generate innovation insights and develop commercial research partnerships between UK businesses and institutions and overseas counterparts.

It is a substantial programme, with 30-40 annual missions, each costing approximately £45,000 and planned in detail, with leading researchers participating, and structured around meetings and innovation briefing events.

The region remains a priority for the GEM programme, with a mission to South Korea, focused on 5G, taking place in March 2023. The missions are often developed in partnership with strategic agencies and industry bodies – for instance, the Korea Chamber of Commerce and Industry.

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[7] https://www.immerseuk.org/wp-content/uploads/2022/10/Immersive-Economy-2022-final-13-Oct.pdf

2.6 Societal and environmental themes

Many of the arts and technology projects, commissions and productions that have been developed in recent years have aimed to address distinctive and pressing themes

This was reflected in the most recent Beyond conference of 2022, which took place in Cardiff and was themed around "understanding what part the creative industries should play in designing a zero-carbon future?"[8]

Over the course of the conference, businesses and research institutions showcased creative works and R&D projects, many of which were funded by UKRI, and which were concerned with the climate crisis, environmental challenges and shaping a more sustainable future.

It has also been reflected in the British Council's own programme with the Climate Connection providing a platform for 17 creative digital commissions in 2021 intended to "stimulate global conversations about climate change and to inspire transformational change[9]."

Through these commissions, a wide range of environmental issues were explored, including extreme weather, climate migration, the problem of plastic waste, excessive resource consumption, tackling food waste and encouraging the reuse of materials.

The commissioned projects included The Gathering Moss[10], a collaboration between South Korean media artists Bang & Lee and Watershed in Bristol that provided creative works in response to the revered natural environment of Jeju Island.

Given the ever-increasing levels of awareness around climate change and the need for an international response, more and more artists are addressing it in their work.

There is likely to be considerable appetite for further such arts and technology projects that address this theme, and for programmes that can develop new collaborations between UK and Asian digital artists who are working in this field.

2.7 British Council and Arts and Technology

The British Council has been active in the field of arts and technology for some years, supporting UK creatives and cultural producers to build international connections in networks. As the references above show, this has included working with leading UK-based organisations on programmes and projects in East Asia.

Particularly significant in recent years has been the partnership between British Council, British Underground and Arts Council England on the Future Art and Culture showcasing programme, which promotes international artists, curators and creative producers working on the boundaries of art and technology through exhibitions, panel discussions and networking events. The programme has evolved from having a mutual presence at SXSW – with British Council supporting the programme in 2023 showcasing five immersive projects with associated panels at the festival. There is increasing appetite for various UK organisations to build a shared presence at international platforms to amplify the UK's strengths in the arts and technology field.

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[8] https://beyondconference.org/#themes

[9] https://www.britishcouncil.org/climate-connection/be-inspired/creative-commissions

[10] https://gatheringmoss.art/main/

During the pandemic, the British Council was able to adapt its arts funding programmes to support digital connections through its Digital Collaboration Fund.[11] The fund supported collaborative digital R&D projects between the UK and Kenya, Ghana, Venezuela, Mexico, Lebanon, Brazil, Argentina, Vietnam and Pakistan.

The importance of building connections in arts and technology between the UK and East Asia has been recognised at the strategic level with the Culture Connects Us online festival forming a central element of UK in Japan, an initiative by the British Council and the British Embassy Tokyo, highlighting collaborations in culture, business and education. As part of UK in Japan, an online roundtable was held on the subject of 'The Future of Arts and Technology', focused on promoting collaborative research and development, and the remit for arts and technology projects to address broader societal challenges[12].

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[11] https://www.britishcouncil.org/arts/digital-collaboration-fund

[12] https://www.britishcouncil.org/research-policy-insight/insight-articles/UK-Japan-arts-technology

3. Hong Kong

3.1 Hong Kong's creative sector and market

3.1.1 Cultural and creative industries overview

Software, computer games and interactive media dominate Hong Kong's creative and cultural industries.

Across Hong Kong's cultural and creative industries (CCIs) sectors, 'software computer games and interactive media' was the largest in terms of both value added and employment, accounting for more than 47% of the market value and 29% of the total employment in the CCIs.

Similarly, the largest proportion of Hong Kong's creative and cultural exports were in 'audio-visual and interactive media goods' – accounting for 73% of all cultural exports.

In terms of the role of the CCIs in Hong Kong's economy, the most recent (2020) statistics estimated that these industries represent around 4.5% of Gross Domestic Production and 6.2% employment. Cultural and creative goods and services made up 15% of Hong Kong's total exports in 2020.[13]

The pandemic disrupted Hong Kong's CCI supply chains, causing it to look inward for development opportunities.

As with elsewhere around the world, Hong Kong's CCIs were significantly impacted by the onset of the Covid-19 pandemic. This was exacerbated by the integration of Hong Kong's CCIs with the manufacturing base in Guangdong province, mainland China, which, prior to the pandemic, had supported the development of industries such as printing, publishing, merchandising, product design, architectural design, fashion design, film production, games design and animation.

Hong Kong's strict border closure stalled this integration and put pressure on creative businesses and industries to look locally for talent and production capacity. A consultee for this research gave the example of the undergraduate arts and design programme in the Hang Seng University of Hong Kong having to look locally for sponsors of their 3D printing project as a result of the pandemic, whereas previous sponsors had all been from mainland China.

3.1.2 Market trends

Technology is becoming increasingly instrumental to Hong Kong's role as a globally significant art market and IP trading hub.

Trade in art and IP are important pillars of Hong Kong's cultural and creative industries. The city benefits from a favourable regulatory environment (Hong Kong has no tariff on import and export of art), its transport links to other parts of Asia and Australia and its proximity to mainland China.[14]

Government policy has supported Hong Kong to position itself as a regional IP trading hub,[15] helping mainland Chinese enterprises access international markets while acting as a gateway for overseas investors to do business in China, especially in the Guangdong-Hong Kong-Macao Greater Bay Area (GBA), an international cluster for science and technological innovation.

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[13] Source: https://www.censtatd.gov.hk/en/data/stat_report/product/FA100120/att/B72206FB2022XXXXB0100.pdf

[14] Source: https://www.hugillandip.com/2019/03/advantages-of-hong-kong-as-an-art-trading-hub-and-the-growth-of-cryptocurrencies-in-artwork-transactions/

[15] The 14th National Five-year Plan lays out ambitions for Hong Kong 'to develop into a regional intellectual property trading centre, promote service industries for high-end and high value-added development' (Section 1: Chapter 61)

Trademark activity in Hong Kong grew by 10% in 2022, reaching double the global average. It should be noted that Hong Kong's intellectual property department oversees all IP-related matters. It does not have a dedicated bureau for copyright unlike other countries in the region such as South Korea, limiting opportunities to enact CCI-specific IP strategies.

The use and uptake of virtual platforms for the dissemination and sale of cultural works and products has accelerated over the past three years.

Despite one of the strictest Covid prevention regimes in the world, Hong Kong's share of the global art market share rose from 17.5% in 2019 to 23.2% in 2020, overtaking London for the first time to become the second largest arts trading centre in the world.[16]

Accelerated by the pandemic, technology has been transforming the way that art is produced and sold in Hong Kong over this period. Online sales exceeded general retail sales in Hong Kong's art market for the first time in 2020.

In the same year, Sotheby's recorded HK$684million of sales in its first ever live-streamed contemporary art auction in Hong Kong.[17] The auction house has upgraded their online offering with enhanced digital catalogues, virtual specialist guided tours, virtual exhibitions, part of a broader trend in which Hong Kong galleries and auction houses are adopting immersive and interactive technologies, such as VR and AR, into their events and offerings.

Proliferation of new technologies is also attracting new audiences and consumers: both Christie's and Sotheby's reported that bidders aged 40 or younger accounted for more than 30 percent of Hong Kong sales in 2020, compared to 8 percent in 2016.[18]

Hong Kong has been dubbed 'the next NFT hub' after significant public and private investment in web3.0 technologies.

2020 also saw the launch of the first Digital Art Fair in Hong Kong, a web3.0 art fair featuring both digital and NFT art.

Web3.0 technologies have generated significant interest and investment in Hong Kong, from both the market and government. This has been helped by a ban on cryptocurrency in mainland China in September 2021 which caused a migration of NFT enthusiasts to Hong Kong and a spike in bidding interest.

The prominence of NFTs has been visible across the city, with large-scale ad campaigns for NFT projects Degenerate Ape Academy and Delirious Mind Travellers running in prominent locations across Hong Kong.

Elsewhere, Animoca brands, the Hong Kong based software and venture capital company who developed early metaverse video game The Sandbox, recently raised almost US$225m of capital for its NFT and metaverse portfolio. The company is valued at US$5.9 billion.

The Hong Kong government has responded by outlining plans to license retail investors to trade cryptocurrencies Bitcoin and Ether, as well as pledging HK$50m in the 2023-24 budget to boost the development of web3.0 industry. One of the ambitions of the funds is to attract one thousand web3.0 startups to Hong Kong in the next three years.

[16] Source: ArtTactic/ investHK

[17] Source: https://news.artnet.com/market/sothebys-livestreamed-hong-kong-contemporary-1913375

[18] Source: https://asiahubhk.economist.com/how-hong-kong-became-a-hub-for-asias-biggest-art-deals/

3.1.3 Challenges

In addition to a contraction in the CCIs following the pandemic, Hong Kong has a shrinking creative workforce.

For years Hong Kong's development has benefitted from being adjacent to mainland China in addition to having a common law system; a large English-speaking population; efficient shipments and logistics and business practices that adhere to international standards. Many international companies chose to base their headquarters in Hong Kong, regarding it as a springboard to the Chinese and wider Asian markets.

The implementation of the National Security Law in 2020, however, coupled with some of the strictest quarantine measures, have seen many foreign companies, expats and locals leaving Hong Kong. A 2022 survey showed that nearly 50% of European companies in Hong Kong plan to fully or partially relocate their operation and staff out of the city.[19] More recent reports suggest that although this has slowed down since the relaxation of restrictions, relocations are expected to continue over the course of 2023, with Singapore a favoured destination[20].

Accordingly, Hong Kong's workforce has been shrinking since 2019, with record numbers of vacancies and 85% of businesses expressing concerns over talent shortages. This is particularly relevant to arts and technology, given many of the technologies developed and used by creatives are already subject to world-wide skills shortages.

Professionals in Hong Kong's creative and cultural industries have also raised concerns that China's ambitions to be self-reliant in terms of technology, alongside increased scrutiny in the West towards Chinese tech companies and platforms such as Huawei and TikTok, could ultimately change the direction of arts and technology in Hong Kong. These developments, collectively referred to as the 'tech wars', may potentially lead to Chinese creators being limited to home-grown technologies and platforms.

3.2 Hong Kong's policy and investment environment

3.2.1 Strategic objectives

Hong Kong is moving towards a more outward-looking, integrated cultural and creative industries (CCIs) policy.

In 2022, Hong Kong's Culture, Sports and Tourism Bureau (CSTB) was established in what could be seen as a response to long-standing criticism of the city's separation of arts and cultural policy – under the purview of Home Affairs – and creative industries policy, which had been under the purview of Commerce and Economic Development.

The restructuring and the creation of the CSTB has been understood as a more concerted effort to promote Hong Kong's CCIs. The incorporation of tourism into the Bureau is also significant as a recognition of the potential of the CCIs to catalyse cultural exchange and to promote Hong Kong as a destination internationally.

[19] Source: https://www.bloomberg.com/news/articles/2022-03-24/nearly-50-of-foreign-firms-in-hong-kong-plan-to-relocate-staff#xj4y7vzkg
[20] https://officefinder.com.sg/relocations-to-singapore-from-hong-kong-slowed-down-in-q1-2023/

This responds to Beijing's 14th five-year plan, released in 2021, which lays out ambitions for Hong Kong to fashion itself as an international centre for innovation and technology as well as a centre for cultural exchange.

Since 2020, 'Arts Tech' has been prioritised by Hong Kong policymakers with a renewed urgency.

As noted in the previous section, pandemic disruption to Hong Kong's CCIs supply chains prompted increased introspection around domestic cultural and creative industries development from Hong Kong think tanks and policymakers.

Calls to refresh policy towards arts and technology was led by think tank Our Hong Kong Foundation, who published the report 'Innovating Creative Cultures: Arts Tech'[21] in May 2020, which laid out a range of measures to support the sector.

Following the report, arts and technology was officially incorporated into the city's development strategies in the 2020 Policy Address, which was given by the Chief Executive of the Hong Kong Special Administrative Region, and included a dedicated section on Arts Tech[22].

Part of this strategy included the establishment of an inter-bureau task force to spearhead Arts Tech development. Led by the Home Affairs Bureau, the task force is comprised of representatives from the Innovation and Technology Bureau, the Education Bureau and relevant NGOs. It also set aside a total HK$100m to be distributed through various funds in support of the development of Arts Tech. At this time, officials acknowledged that Arts Tech development in Hong Kong was in a 'preliminary stage' and trailed that of neighbouring countries.[23]

It is notable that a follow-up 2022 report from Our Hong Kong Foundation, which benchmarks Arts Tech policy and infrastructure overseas, focuses on South Korea, mainland China, Taiwan and the UK. This indicates that Hong Kong regards the UK as a leading nation when it comes to support for the development of digital arts.[24]

3.2.2 Funding and investment

Funding for arts and tech initiatives in Hong Kong comes from a range of governmental departments and bodies. In addition, the Hong Kong Jockey Club – a major funder of Hong Kong arts and culture – has invested significantly to develop arts and tech programmes, infrastructure and skills.

Funder	Funding Initiatives
Culture, Sports and Tourism Bureau (CSTB)	**Arts Capacity Development Funding Scheme (ACDFS)** The ACDFS provides funding for large-scale, multi-year arts and cultural initiatives. 'Arts Tech' was added as a new category in 2021 and three projects received an allocation of HK$10m from a total HK$45m of support. One of these

projects was the Technical Arts Festival organised by the Hong Kong Association of Theatre Technicians and Scenographers. The 2022-23 budget will inject a further HK$10m into the ACDFS to encourage arts groups to explore the use of technology.

Arts Technology Funding Pilot Scheme
The 2022-2023 budget also announced HK$30m for the Arts Technology Funding Pilot Scheme which will encourage Hong Kong's nine major performing arts groups[25] to apply Arts Tech in their stage production.

CreateSmart Initiative
This initiative supports the technology related projects in creative sectors such as advertising, architecture, design, digital entertainment, film, music, printing and publishing and television. It has supported projects encouraging the use of AI technologies in design and fashion.

Hong Kong Arts Development Council (HKADC)

Arts Go Digital Platform Scheme
During the pandemic Hong Kong Arts Development Council (HKADC), the statutory body that promotes arts and culture, launched its Arts Go Digital platform to support arts organisations in the creation of digital or virtual artistic content. The fund provided around HK$20m to support a total of 68 projects.

ARTS.TECH Exhibition
Between July and October 2022, HKADC organised three thematic art tech exhibitions with the support of the Urban Renewal Agency, showcasing local artists and curators and exploring the potential of arts and technology as tools for urban development.

Innovation and Technology Commission (ITC)

Innovation and Technology Support Programme (ITSP)
The Innovation and Technology Support Programme (ITSP) awarded HK$35m to a research team including Hong Kong Baptist University, City University and École Polytechnique Fédérale de Lausanne in Switzerland to develop *Future Cinema Systems* (FCS), a project which develops immersive cinematic environments with innovations in visualisation, co-evolutionary narratives and human computer interaction. The project employs artificial intelligence, computer vision, deep learning, VR and generative aesthetic technologies.

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[25] The nine major performing arts groups are; the Chung Ying Theatre Company, the City Contemporary Dance Company, the Hong Kong Ballet, the Hong Kong Chinese Orchestra, the Hong Kong Dance Company, the Hong Kong Philharmonic Society, the Hong Kong Repertory Theatre, the Hong Kong Sinfonietta and theatre company Zuni Icosahedron

	InnoHK Research Clusters This funding is aimed at international research collaboration, pairing world-renowned universities and research institutes with Hong Kong institutions to create collaborative research laboratories at the Hong Kong Science Park. It is not creative industries specific, although the 'Laboratory for Artificial Intelligence in Design' is one of the funded projects. **Technology Voucher Programme (TVP) and General Support Programme (GSP)** The TVP, launched in 2016, and the GSP provide support for local enterprises or organisations to develop technological services and solutions which improve productivity or transform their business processes. While open to creative businesses, they are not creative industries specific funds.
The Hong Kong Jockey Club (HKJC)	**Support for capital infrastructure** Hong Kong Jockey Club Charities Trust has played an important role supporting the development of arts, culture and R&D infrastructure, including buildings such as: Creativity Hub in Hong Kong Baptist University, the Jockey Club Innovation Tower in Hong Kong Polytechnic University, the Jockey Club Creative Arts Centre in Shek Kip Mei, Hong Kong Palace Museum and the revitalisation of Tai Kwun. **Support for research, programmes and events** HKJC has supported a number of public education programmes and events in arts and tech, including the 'How Memory Sticks' VR and Immersive programme; the Science in Art exhibition of large-scale public works; the Creative Tomorrow arts tech festival; the Arts Tech Lab and Public Education programme with Hong Kong Polytechnic University and other arts tech literacy programmes with secondary school pupils.

3.3 Hong Kong's arts and technology ecosystem

3.3.1 R&D projects

The past few years have seen Hong Kong's universities receive milestone investment from research councils and government commissions for Arts and Tech R&D projects.

These include a major programme in AI Art research led by Hong Kong Baptist University which represents the first Arts Tech project funded by Hong Kong's Research Grants Council, in addition to a two-year investment in the Future Cinema Systems project by the Innovation and Technology Commission's (ITC) - the largest grant the commission has ever made for an Arts Tech project.

Such investments aim to advance Hong Kong's global position in arts and technology development.

> This research project has secured funding from the Research Grants Council (RGC), demonstrating that Hong Kong attaches great importance to the development of artistic and creative technologies based on AI. [.... It will enable Hong Kong to assume a leading position in art-tech on the global stage. – *Hong Kong Research Grants Council*

Example R&D projects in Arts Tech include:

- **Building Platform Technologies for Symbiotic Creativity in Hong Kong, Hong Kong Baptist University (HKBU)**

    – Following a HK$52.8m grant from the Research Grants Council (RGC), the five year project (2021 – 2025) explores new opportunities in AI-based Art Tech. Its first prototype was a 320-voice AI 'choir' performing with an AI 'ballet dancer' who was trained using human body movements alongside data from the movement of box jellyfish to choreograph a dancing style that corresponds to ocean waves.

- **Tsinghua-HKBU AI Laboratory for Creative Arts**

    A partnership between HKBU Augmented Creativity Laboratory and the Institute of Artificial Intelligence at Tsinghua University, Beijing, the Lab undertakes research into AI-based art creation, with a focus on music composition and music performance. Work will build on a 2020 project led by Professor Johnny Poon, called 'Space to Breathe': an immersive exhibition combining music and holographic technology to draw attention to issues of air pollution.

- **Laboratory for Artificial Intelligence in Design (AiDLab) at Hong Kong Polytechnic University (PolyU)**

    – Located at the Hong Kong Science Park, AiDLab is a platform that focuses on the integration of Artificial Intelligence (AI) with design – the first of its kind. It was jointly established by The Hong Kong Polytechnic University and the Royal College of Art (RCA) in the UK, with funding from the Innovation and Technology Commission's InnoHK research clusters, which aim to develop Hong Kong as a hub for global research collaboration.

The lab's primary focus is the design and fashion industries, although some of its research using motion capture and 4D body scanning technologies could also have a wider application across the performing arts – potentially removing the need for uncomfortable suits used in current motion capture performances that can inhibit movement.

- **Future Cinema Systems: Next Generation Art Technologies (HKBU, CityU and École Polytechnique Fédérale de Lausanne)**

    – The project is an attempt to pioneer and develop what is referred to as a 'Future Cinema System' (FCS), and has received HK$35.4m from the Innovation and Technology Commission (ITC).

    A key deliverable of the project, led by Professor Jeffrey Shaw – has been the Visualisation Research Centre, which hosts the world's first 360-degree immersive LED visualisation cinema. A second facility at the Visualisation Research Centre is the iDome Cinema, which uses a fisheye lens to project spherical photos and videos that can be interactively rotated, allowing the audience to 'walk inside' its 360-degree representations.

    It is envisaged that the technology could have particular application in museum contexts as well as functioning as an educational tool for visualising scientific data.

- **Applied Laboratory for Interactive Visualization and Embodiment (ALiVE) City University (CityU)**

    – ALiVE was established under CityU's Centre for Applied Computing and Interactive Media in 2009 by Professors Jeffrey Shaw and Sarah Kenderdine. The Lab initially focused on digital cultural heritage projects, including the digitization of Mogao Caves at Dunhuang.

    Since 2021, under the leadership of Richard Allen, the ALiVE lab has pivoted towards art tech research and emergent forms of creative media. Current projects include the development of networking algorithms using Unreal games engines and the development of a mobile app City in Time, commissioned by Hong Kong Tourism Board, which uses AR and multimedia technologies to bring the city's history to life.

These projects illustrate that Hong Kong's research institutions are collaborating internationally on creative R&D, with research partnerships established in Switzerland, mainland China and the UK.

Further government investment in arts and technology will present new opportunities for UK universities and partners to establish R&D partnerships in Hong Kong.

3.3.2 Higher education

Hong Kong's education institutions play an important role in the development of talent and artistic practice in Arts Tech.

Many prominent artists in Hong Kong's Arts Tech sphere either graduated from or have worked with programmes and courses offered in digital arts and creative technologies. Courses and departments work in collaboration with artists and former graduates, with local authorities and in one case with a UK university partner.

Since the 2020 policy address establishing Arts Tech as a priority policy area, new courses have been developed to meet anticipated skills shortages in the arts and technology sphere. The partnership between Vocational Training Council (VTC) and Coventry University provides a model for Hong Kong-UK collaboration to upskill the creative and technical workforce.

Institution	Details
The School of Theatre and Entertainment Art, Hong Kong Academy of Performing Arts (HKAPA)	The School of Theatre and Entertainment Art consists of three departments: Media Design & Technology, Technical Production & Management and Theatre Design at both undergraduate and graduate level, as well as offering shorter vocational courses. The School has collaborated with local artists and venues to produce performances and events showcasing new technologies.
Department of Arts and Design, The Hang Seng University of Hong Kong	The department shares access to the Virtual Reality and Big Data Analytics Laboratory facility, enabling BA students to work on digital art projects as part of their courses. In 2018, the BA Cultural and Creative Industries programme collaborated with the Art Promotion Office of the Leisure and Cultural Services Department (LCSD) to organise the *International Symposium on Augmented Reality Public Art* and to create and curate AR public art works on HSU campus and other sites around the city, working with artists including Tamiko Thiel, Desmond Hui, Chris Cheung, Helen Pun, Phoebe Man, Ellen Pau, Cédric Maridet and John Craig Freeman.
Department of Digital Media, Hong Kong Design Institute	The department offers Higher Diplomas in Creative Media; Digital Music and Media, Transmedia, Animation and Visual Effects and Film, Television and Photography. These programmes are connected to the BA (Hons) Creative Media course at Coventry University. The Department also offers certificates in Digital Visualisation with Unreal Engines and the Metaverse.

BA & BsC (Hons) in Arts Tech, Hong Kong Baptist University (HKBU)	A transdisciplinary programme established in 2022 following the 2020 policy address, the courses offer modules in Extended Reality, Immersive Media Art, Generative Art and AI, Intelligent Sound and Music Production, Creative Robotics and Games Art and Design. See deep dive case study for further details.
Higher Diploma in Arts Technology, Vocational Training Council (VTC)	A two-year vocational course established in response to the 2020 policy address and the 'foreseen manpower demand for arts tech talents in the arts and creative industries'. Should students wish to continue their education following the end of the course, they are eligible to apply for a top up degree programme at Coventry University (BA Media) or a number of the Hong Kong courses and departments highlighted above.
Creative Media Programmes, School of Creative Media (CityU)	City U's Creative / New Media Programmes hosted at the School of Creative Media are interdisciplinary courses spanning computer science, visual design, digital technologies, and cultural studies. Notable graduates of the school include GayBird, Allen Fung, Alan Kwan Tsz-wai and Allison Yang.

Deep dive: Bachelor of Arts and Science (Hons) in Arts Tech at Hong Kong Baptist University

In 2022, Hong Kong Baptist University underwent a restructure to establish the School of Creative Arts. The School houses a new transdisciplinary program: the Bachelors of Arts and Science (Hons) in Arts Tech.

These Arts Tech programmes were created in direct response to the 2020 Policy Address calling for the development of Art Tech in Hong Kong. The curriculum is designed to prepare students to become innovators proficient in art, culture, and technology. The programme offers three pathways– visual, sound, or technology in addition to the core foundational courses.

According to Programme Director, Mr. Kingsley Ng, who is himself a practising artist and designer, while CityU's School of Creative Media has been active in Arts Tech from the perspective of visual, digital and media arts, recent Arts Tech developments in Hong Kong appear to be prioritising the development of performing arts and virtual production.

The Arts Tech courses therefore aims to fill the gap by providing a more holistic training for future arts practitioners. Students learn from experts across a wider range of disciplines, including the visual arts, music, film and computer science.

The programme is designed not only to teach students about technological applications but also to teach them to think critically about what they are doing, and why they are doing it.

It covers a range of historical and theoretical perspectives and aims to equip students with an awareness of ethical issues, a sense of aesthetics and originality as well as the vision to tackle global challenges that are necessary to become professional arts tech practitioners. One of the core modules on all transdisciplinary programmes is 'Global Challenges', which looks at course content in relation the United Nations' Sustainable Development Goals.

With this direction in mind, Ng believes that Arts Tech should not be just about 'eye candy' or attracting visitors to take selfies. He hopes the course will produce projects that are pushing artistic and technological boundaries.

Ng acknowledges there is work to be done in Hong Kong when it comes to audience development. One of the challenges that the Arts Tech programme faces is that students are not exposed enough to arts and culture before they are admitted to the university. However, Ng thinks the situation is gradually improving in recent years with more cultural venues opening, such as M+ and Tai Kwun.

It is notable that half of the cohort in the Arts Tech programme is female, however Ng feels that more structured training in Art Tech disciplines is still needed to widen women and minorities' access to the Art Tech sector.

The Arts Tech degree programme is supported by a range of new facilities and research initiatives, including the world's first 360-degree immersive LED visualization cinema and the 180-degree iDome Cinema.

The Bachelor of Arts and Science in Arts Tech at Hong Kong Baptist University is a key example of the ways in which arts education in Hong Kong is restructuring across disciplines in reaction to government policy directives.

Ng he sees a need to not just seize the opportunity opened up by the Art Tech policy, but also to contribute to shaping future artistic practice.

This will involve remaining open to international collaboration and cultural exchanges. Ng believes that art is a crucial tool to open up different perspectives in a polarised world.

Image credit: © School of Creative Arts, HKBU

3.3.3 Venues and infrastructure

Lack of infrastructure has disadvantaged the development of the Arts Tech sector in Hong Kong, however new venues are opening or are in development.

Space is at a premium in Hong Kong. Most arts and cultural venues in Hong Kong are owned and run by the government for a wide variety of artistic, cultural and community uses. The venues tend to be over-subscribed with long waiting lists for theatres and performances spaces combined with frustrations relating to an overly bureaucratic administration system and rudimentary technical facilities. This does not favour the production and exhibition of Arts Tech works, which can be complex and time-intensive to install.

However, the development of the **West Kowloon Cultural District** (WKCD) has begun to have a considerable impact in terms of broadening Hong Kong's range of cultural spaces and venues. Established in 2008, the WKCD covers 40 hectares and is one of the world's largest cultural quarters. Alongside offices, open spaces, entertainment and retail it features major cultural facilities and venues such as Hong Kong Palace Museum, the Freespace performing arts venue, the Xiqu Centre theatre and M+, the museum of visual culture, which opened in 2021 and features extensive exhibition space across its galleries and cinemas. Although only open for two years, the M+ has been significant in presenting innovative local and international work to Hong Kong audiences, with Arts Tech an important element of its programming.

Infrastructure and facilities are also expected to be considerably enhanced with the development of the **East Kowloon Cultural Centre** (see deep dive case study). At the same time, the re-opening in 2018 of the historic Tai Kwun as an arts centre has given the central business district an important new exhibition space for Arts Tech works.

Universities and research campuses also play an important role in providing infrastructure and venues for Arts and Tech practitioners. The Jockey Club **Creative Hub**, which will form part of HKBU's Creative Media and Practice Research Cluster, will include a large experimental space for immersive arts productions called the **Jockey Club White Box Experimental Space**. The Hub is due to be completed in 2024.

Another new development, albeit with a more commercial focus, is the **Experience Centre,** launched in May 2021 at the Hong Kong Science and Technology Park (HKSTP). It is a 370m^2 venue dedicated to showcasing Hong Kong's innovation. It hosts an on-site immersive interactive experience as well as a dedicated Design and Art Tech collaboration space.

3.3.4 Public engagement

Hong Kong's HEIs also offer public engagement programmes, exploring social and cultural impacts of new technologies and nurturing the next generation of talent in arts and technology.

The technical characteristics of Arts Tech projects mean that communities are often not engaged until the point of consumption – as audiences and consumers (even if this consumption is interactive), rather than co-creators. However, there are several examples of initiatives which engage the Hong Kong public with arts and technology creation – as well as exploring the potential social and cultural impact of these technologies.

For example, Hong Kong Polytechnic University's College of Professional and Continuing Education with support from Hong Kong Jockey Club will run the '**Arts Tech Lab and Public Education Programme**'.[26] The programme will work with artists and local communities to advance understanding and experience of the way digital media are being incorporated into traditional art practices. The Lab is also intended to be a space for investigation and dialogue into the way that Art Tech affects contemporary culture and society.

Other initiatives, such as Hong Kong City University's **Jockey Club Project IDEA (Inclusive Digital and Experimental Art)** and the **Jockey Club Augmented Reality in Arts Education Project**, organised by **Osage Art Foundation,** work with pupils and teach to enhance digital literacy and technical skills, developing the next generation while exploring ways to make arts and technology as a vehicle for artistic expression more accessible to learners.

These programmes are unique across the countries and territories that are the focus of this research and represent an innovative approach to arts and technology talent and audience development that may be of interest to UK cultural practitioners who share similar objectives.

3.3.5 Events, networking and knowledge exchange

In support of its Arts Tech policy and research objectives, Hong Kong institutions have hosted events and platforms to stimulate networking and knowledge exchange in the field of arts and technology.

These include meet-up events, such as the 2022 **Art x Tech Meetup** at the Hong Kong Science and Technology Park and similar startup event **Cyberport** in 2021.

In partnership with the School of Theatre and Entertainment Arts at the Hong Kong Academy for Performing Arts, **West Kowloon Cultural District** also programmed a series of talks, installations and performances exploring contemporary Art Tech practice called **TechBox – art TALKS tech.**

Hong Kong does not have a dedicated, international Arts Tech festival. However, established festivals have recently incorporated Arts Tech as a thematic lens in response to government policy objectives, including Arts Tech programming strands at West Kowloon Cultural District's **Creative Tomorrow** festival, the **International Arts Carnival** and **New Vision Art Festival,** and the launch of the **Jockey Club InnoArt Series** as part of **Hong Kong Art Festival** in 2022.

These events and others offer key future opportunities for UK artists and producers to showcase their work and collaborate with a rapidly developing arts and technology scene in Hong Kong.

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[26] https://profile.cpce-polyu.edu.hk/en/projects/arts-tech-lab-and-public-education-programme-the-hong-kong-jockey

Deep dive: East Kowloon Cultural Centre

East Kowloon Cultural Centre (EKCC) aims to establish a state-of-the-art performing arts venue that facilitates pioneering arts and technology practice. The venue is being constructed on a 2-hectare site for a budget of HK$4 billion, as part of the redevelopment of the Lower Ngau Tau Kok Public housing estate. EKCC was designed by Rocco Design Architects Limited (RDA); as part of this process RDA engaged the UK technical design company Theatreplan as a consultant on the design of three of the EKCC's five theatres.

The venue is scheduled to open in phases across 2023 and 2024, with recent government policy directives supporting its development. A pilot project was devised in 2016 to turn East Kowloon into a 'smart city', while the government's 2019 and 2020 Policy Addresses set out deliberate plans to invest in the EKCC as the flagship cultural venue to lead and support the development of Arts Tech in Hong Kong.

These policy directives – and a recognition of the need to provide better access to technologically advanced facilities - brought in additional resources for EKCC to upgrade its planned facilities, and the 2022-23 budget has earmarked $85 million annually to support its operation. [27]

The facilities include 3D projection mapping equipment, immersive audio system, all-round real-time stage tracking and execution system and a live streaming system. The façade will also have transparent LED wall. Three of the five planned facilities at EKCC will have retractable seats and can also be used to showcase different media arts and interactive arts installations, supporting EKCC's ambition to be a cultural hub and not just a performing arts venue.

There is also a planned multipurpose R&D indicator studio which will act as a testbed – named The Lab – which will host extended reality equipment, 270-degree LED screens, a 4k video filming system and an image processing system.

EKCC will be joining the sixteen other performing arts venues operated by the Leisure and Cultural Services Department (LCSD) of the Hong Kong government. Unlike other LCSD venues, apart from offering facilities for hire, the EKCC has its own programming team and will largely be in charge of the programme curation at the venue, outside of being allocated shows by other LCSD programme offices, such as the Festivals Office. To support the convergence of arts and technology, the EKCC will receive proposals from artists and cultural organisations and select, according to the established mechanism of the LCSD, the best programmes to present within allocated resources.

Rebecca Yu, Chief Manager for East Kowloon Cultural Centre and Planning Section at LCSD, took up leadership of EKCC from 2018. She observes that arts tech development in Hong Kong is still in its preliminary stages and that the established venues, and their booking systems, are not optimised for Arts Tech productions.

The venue hopes to respond to a lack of opportunities for artists and technologists to encounter each other and better understand the possibilities arising from collaboration, building on a series

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[27]https://www.budget.gov.hk/2022/eng/budget34.html#:~:text=To%20further%20facilitate%20arts%20technology,to%20enrich%20their%20stage%20production

of talks, workshops and meetups LCSD and EKCC have programmed throughout 2021 and 2022.

Like other LCSD venues, it will also run a Venue Partnership Scheme and an Artist-in-Residence Pilot Scheme (at the time of writing, venue partners have yet to be announced).

While the venue has not yet opened its doors, in 2022 the **EKCC Academy for Arts Tech** was established, offering short courses on the operation of immersive audio systems; advanced light systems and media servers and live-streaming systems.

Yu sees the Academy as a crucial piece of the puzzle, given a lack of similar training provision in Hong Kong or the Greater Bay Area (GBA) to date.

Once up and running, EKCC is planning to run a series of cultural exchange and collaboration programmes. The venue has already begun to develop its international networks, with staff visiting Montreal in 2022 and the UK in 2023, as part of a British Council-led art tech delegation. During the visit, EKCC expressed a strong desire to collaborate with the UK, to build creative exchange and to learn from UK partners.

This represents a key opportunity for UK artists and organisations to participate in the development of the venue and the sector.

Image credit: © Rocco Design Limited

3.4 Cultural Producers

Hong Kong's artists and collectives are incorporating a diverse range of technologies and tools in their practice, often used as a way of highlighting or delving deeper into social, cultural or environmental issues.

Alongside a thriving visual arts scene drawing on whole suite of technologies beyond projection and XR technologies most readily associated with visual arts, there is also a vibrant network of electronic composers and sonic artists using tracking systems, computational analysis and robotic devices to pioneer new ways to create and interpret sounds.

There is less activity taking place among performing arts groups and institutions in the way of technological innovation – perhaps in part as a result of the challenges accessing equipped venues – although government support has been made available to stimulate the use of technology across Hong Kong's major performing arts groups.

On the tech side, while Hong Kong is not a significant manufacturing base for tech hardware, it is an attractive regional base for suppliers. It is also home to some globally innovative creative solutions agencies which support and work with local artists.

It is notable that many of the artists and practitioners outlined in this section have existing links to the UK, either through dissemination of their work, or, in many cases as alumni of the UK's leading art and design colleges.

3.4.1 Artists and cultural organisations

Visual arts

Hong Kong's visual artists and arts academics have been incorporating a range of technologies – including generative art, machine learning and robotics - into their practice as a means to explore social and environmental issues.

Well-established visual artists such as **Ellen Pau,** a video artist, and key figure in Hong Kong's art scene since the 1980s (co-founding Videotage in 1986 and Microwave International New Media Art Festival in 1996) have been exploring the creative potential of new technologies through their works.

Pau's 2022 work *The Shape of Light,* co-commissioned by M+ and Art Basel, used digitally animated special effects to feature The Heart Sutra expressed through sign language, projected on to M+'s facade. The large scale of this projection, 65 x 110 metres, meant that it was visible at a distance of more than a kilometre and could be seen from Hong Kong Island. Pau's work often explores social and political issues, such as her 2018 AR work *I Don't Have Time to Deal with Fear,* which interrogates the role that technology plays in mediating or whitewashing historical violence.

Keith Lam is a 'new media' artist, curator and founder of Hong Kong – Taiwan new media creative studio **Dimension Plus.** His works span technologies such as machine learning, 3D printing, sensory installations and robotics. His most recent installation 'TTTV Garden', commissioned by Hong King Design Institute, explores the interdependence of technology and nature through machine learning and analysis of the 24-hours news cycle, used to optimise the

growth of the indoor plants. **Carla Chan** also uses real-time data from meteorological sources to create a set of NFTs which are ever-changing with the weather.

Phoebe Hui is a multimedia artist and lecturer at Hong Kong Design Institute. Her works explores the interconnectedness between human beings and machines. Hui attended the School of Creative Media in City U before undertaking an MA in Fine Art from Central Saint Martin's College in London. Her work *The Moon is Leaving us*, exhibited at the Tai Kwun Centre, was produced using a computer programme intertwining 150 images of the moon from 17th-century engravings to open-source imagery from NASA.

Music and sonic arts

Hong Kong is home to a rich ecosystem of electronic composers and sonic artists and collectives.

Gaybird is a Hong Kong-based multidisciplinary artist, composer and electronic musician making pioneering musical works and performances at the intersection of mechanical engineering, electronic programming, robotics and visual effects. His work (*Keep) Breathing at Zero* involves a human interacting with robotic camera to produce an extended reality effect using projection mapping techniques.

Another artist pioneering uses of audio technologies is **Samson Young,** winner of the inaugural Sigg Prize in 2020, awarded by M+ for contemporary Chinese artists. Young has received international acclaim for his work using sound, performance, video and installation technologies, which have exhibited internationally, including the Guggenheim Museum, M+ Pavilion and Kunsthalle Düsseldorf. Young founded **Contemporary Musiking Hong Kong,** an artistic collective devoted to the promotion, presentation, and advocacy for cross-disciplinary practices in sound. The group co-presents the event series **Sonic Anchor** with the Hong Kong Arts Centre.

Other electronic composers and multimedia sonic artists include **Choi Sai Ho**, whose work was chosen by the Sonar Calling project to be sent to space by a radio telescope in 2018; **Chaklam Ng**, who worked to develop a device that translates human dialogues into rhythm and tone; and **Echo Hui**, who draws on her experience of congenital anosmia through the creation of works using mechanical set ups to explore the human senses.

Performing arts

Experimental theatre group Zuni Icosahedron is leading innovation in Hong Kong's performing arts sector, while other performing arts groups are being encouraged to follow suit.

Zuni Icosahedron is one of the nine major professional performing arts groups in Hong Kong, as recognised by the government of the Hong Kong SAR, from which it receives central funding. It focuses on experimental theatre and is based at the Hong Kong Cultural Centre. The company have developed a specific unit to explore technological innovations in theatre, called the Z Innovation Lab. As well as developing performances, the Lab has a public-facing role, hosting workshops, symposia and masterclasses with the public and other practitioners to educate them on the role of tech in the performing arts.

Zuni Icosahedron has a close partnership with Zurich University of the Arts through their 'Twin Lab' initiative, which in 2018 produced simultaneous telematic performance experiment 'The Hidden Formula-The Heavenly Palace' using video projections, motion capture and avatars, showing at Hong Kong Cultural Centre's Studio Theatre and a theatre venue at Zurich University of the Arts.

While Zuni Icosahedron is perhaps the most advanced of Hong Kong's major performing arts groups in terms of arts and technology collaborations, the Culture, Sports and Tourism Bureau's (CSTB) Arts Technology Funding Pilot Scheme is specifically aimed at supporting these companies to incorporate new technologies into their productions and stagecraft. This may lead to future opportunities for arts and tech collaborations across Hong Kong's performing arts sector.

3.4.2 Tech companies and creative businesses

Hong Kong's agencies and studios provide technological solutions with a range of creative applications, often working transnationally with branches in other countries or in mainland China.

While Hong Kong does not have the same legacy of large technology manufacturers as Japan and South Korea, it is home to creative business developing experimental technologies with input from local artists and designers. Many of these businesses have a footprint overseas, in mainland China, North America and/or Europe.

These include **IOIO Creative**, a transmedia studio which participated in the East Kowloon Cultural Centres test bed studio exploring the use of facial recognition, silhouette projection and interactive games in a theatre setting. The studio has also undertaken large-scale VR, AR, gaming, kinetic installation and ultra-large projection projects for clients in Hong Kong and mainland China.

Metaobjects is a studio based in Hong Kong and London working to facilitate digital production with artists and cultural institutions, acting as a production office, curatorial office and technology consultant. The studio has worked with artists Carla Chan and Lu Yang on generative artworks and motion-tracking systems and are currently working on a new virtual exhibition space, V Hall for the Tai Kwun Centre. Metaobjects co-founder Ashley Lee Wong studied at the School of Creative Media, City U and Goldsmiths, University of London.

Although they primarily work with commercial clients, 'brandtech' company **Gusto Collective**, which is based in Hong Kong with offices in Tokyo, Shanghai and London, created 'metahuman' artist MonoC (a virtual human who produces generative art borne out of data). A generative artwork created by MonoC used data points from the Philips auction website over the seven-day auction period, disrupting the traditional arts value chain as no-one knew what it would look like until the sale was completed.

Deep dive: Victor Wong

Hong-Kong based artist Victor Wong built a 30-year career in the computer graphics industry, moving from TV, advertising and games to the creation of visual effects for films.

In 2011, Wong founded multi-award-winning visual effects agency vfxNova Digital Productions. The company now employs 170 people at their studios in Foshan, Guangdong Province, China and their Hong Kong head office. vfxNova has worked on numerous Hollywood blockbusters and is seen as sector-leader in Asia.

This career path introduced Wong to a range of digital technologies, spanning AR, VR and AI, many of which he uses in his artistic practice today. He feels that his technological fluency had enabled him to pick up Arts Tech projects quickly at a time where the popularity and demand for innovative work has rocketed.

To date, most of his work has focused on celebrating and exploring Chinese cultural heritage using advanced technologies. This includes a digital recreation of 20th Century Kung Fu Master Lam Sai Wing for the International Guoshu Association; a reanimated version of Master Xu Bei Hong's horse ink-paintings for Hong Kong Jockey Club; and an LED and steel sculpture commissioned by the Hong Kong Museum of Art inspired by ancient Chinese brass mirrors.

Wong's most well-known work, however, has stemmed from the software system he developed called *Tech-iNK,* which can draw Chinese ink in a 3-dimensional space, with formulae that reflect rice paper characteristics so that digital ink can be absorbed in all directions to create 3-dimensional ink strokes.

Building on this project, Wong started exploring the use of AI to create ink art and spent three years building and training AI Gemini, a robotic arm equipped with AI that can paint Chinese landscapes with ink and traditional soft brushes, on fresh xuan paper. The first AI ink landscape series *Escapism* created by Wong and AI Gemini was exhibited in Taipei in January 2019 and had been collected by international collectors such as Uli Sigg.

The second series *Far Side of the Moon* was inspired by China's Chang'e-4's landing on the distant hemisphere of the moon. AI Gemini painted the lunar topography with exploration data from NASA and close-up photos released by CNSA (China National Space Administration), reinterpreting the terrain of the moon and live-drawing the landscape with Chinese ink and a robotic arm.

While his work is distinctively Chinese, Wong says that he tries to find ways to present Chinese civilisations, either in content or method, in a way that resonates with overseas audiences. So far he has succeeded: his *Far Side of the Moon* series was picked up at London 3812 Gallery in 2019 and has received international interest and acclaim.[28]

At the end of 2021, Wong was commissioned by HSBC and Ad Agency MSL to come up with an 'ever-changing' artwork for their new Premiere Financial Center located at K11 Atelier, Hong Kong.

[28] https://www.artsandcollections.com/victor-wongs-far-side-of-the-moon-showcases-chinese-ink-art-by-artificial-intelligence/

Wong came up with the idea of using Hong Kong Heng Sang Index to create landscape painting called the Art of Progress, which has won more than ten awards including at the Hong Kong Kam Fan Awards and the New York Festivals Awards.

Wong has also produced a best-selling NFT, marketed at the Hong Kong Digital Art Fair in 2021 as well as a range of large, real-time data installations and other immersive experiences, commissioned by Hong Kong's major cultural institutions.

As well as his technical skills, Victor Wong has been able to leverage the scale of his business in terms of highly-sought after skilled labour and cutting-edge equipment, both of which have been advantageous to his practice.

It is an advantage that many of his Hong Kong peers do not have: only around 20 of Wong's staff are based in Hong Kong with more than 150 based in mainland China. Even if he could meet Hong Kong salaries for the remainder of his staff, the cost of renting studio or office space for that number of people in Hong Kong is prohibitively expensive.

In many ways, Victor Wong's journey from computer graphics to Arts Tech is emblematic of the current trajectory of Arts Tech development in Hong Kong. The top-down Arts Tech policy in 2020 – and accompanying investment - has nurtured new artists who come for technology backgrounds.

Wong believes the analytical mindset of those with technology and engineering backgrounds is well-suited to developing Arts Tech projects, as these disciplines are about testing and expanding the limits of technology.

The influx of new Arts Tech artists on Hong Kong's art scene is not without its controversy, and some of these projects may not be recognised by established artists as 'proper art' – however collaborating with, outsourcing projects to and commissioning artworks from these artists has so far been a solution to a rapidly developing market.

The pace of this development presents a particular opportunity for UK artists, technicians, and organisations to collaborate with artists such as Wong and build closer ties to Hong Kong's emergent sector.
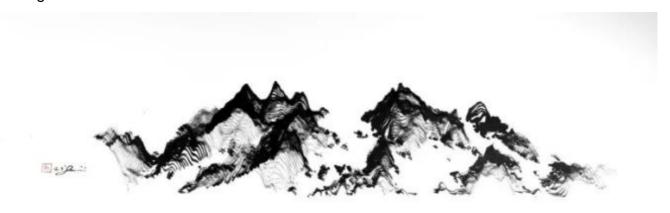

Image credit: © Victor Wong and 3812 Gallery

4. Japan

4.1 Japan's creative sector and market

4.1.1 Cultural and creative industries overview

Japan's content market (music, publishing, video, games, characters) is the third largest in the world.

The measurement of what are globally collectively referred to as the cultural and creative industries are not standardised in Japan. The Ministry of Economy, Trade and Industry (METI) estimated the size of the content market to be ¥10.6 trillion, although this value does not include non-content based cultural industries sub-sectors. The Agency for Cultural Affairs measures Japan's 'cultural GDP', which is broader in scope than industries considered part of the content market, covering museums, performing arts, fine arts, publishing, audio-visual and interactive media and design and creative services and based on UNESCO framework. According to the latest report published in 2021[29] Japan's cultural GDP is 5,584,912 million yen.

Among Japan's commercialised CCIs sectors gaming is the fastest growing sub-sector.[30] Undergoing particularly rapid growth is the mobile and social games industry, for which Japan represents the largest market in the world, estimated to be 1.5 times greater than China and four times the size of the US mobile games market.

Japan's content industry has a well-established pipeline in which creative origination leads to animated, screen and gaming content in addition to character merchandise.

The progression and proliferation of IP across CCIs sub-sectors is significant feature of Japan's content market and has contributed to a rich, complex and highly distinctive culture of cultural production and consumption. In addition to hugely popular franchises such as *Dragon Ball* and *Your Name,* which have mass global appeal, the sector has produces large amounts of distinctly Japanese content for a primarily domestic audience.

These means that some parts of the Japanese content industries are less well-integrated into global supply chains than comparable industries in the US or the UK. The Japanese government has made efforts to promote Japanese culture and content overseas more strategically.

Alongside the content industries, Japanese has long been renowned for its arts, design and fashion.

Japanese decorative arts, crafts and design have been admired, and collected, within Europe for centuries, while in more recent decades design and fashion brands have become increasingly popular worldwide. This includes high-end designers like Issey Miyake, global retail companies Comme des Garcons and Uniqlo, but also streetwear and youth brands such as BAPE and FR2.

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[29] https://www.bunka.go.jp/tokei_hakusho_shuppan/tokeichosa/bunka_gyosei/pdf/93761001_01.pdf

[30] Japanese and Global Media x Content Market Database 2022 Vol. 15 [Fixed Version] (2022)

Japan's visual art market has grown steadily over the last twenty years, and vies with Germany to be the sixth largest market in the world[31]. However, it represents little more than 1% of global contemporary art sales: the US and UK still make up more than 60% of turnover, while the Asian market is dominated by Hong Kong and Beijing, with China representing 28% of all sales[32].

While not on the same level as the likes of Hong Kong, Tokyo is becoming an increasingly important arts centre, with well-known galleries, auction houses and fairs. In particular, Art Fair Tokyo has played an important role in raising the profile of contemporary Japanese art since its foundation in 2005. A new, large-scale international art fair 'Tokyo Gendai' will be launched in July 2023.

The live entertainment market is also experiencing growth. In 2019, the market was estimated to be worth JPY 630 billion and is expected to recover to the same level in 2023, despite the temporary damage caused by Covid.[33]

4.1.2 Market trends

New technologies are becoming integrated into the content pipeline, offering new ways to both create and consume.

An area of particular growth is in the sales of electronic comic books and magazine consumed on smartphones and tablets – known as e-comics - with this market expanding by 2.5 times over the past five years.[31]

Other technologies that have been adopted into the content pipeline include VR and immersive technologies which, alongside their use in artistic practice (see Section 4.4), have been used to produce highly-commercial market-led products and experiences, such as the 'Pokemon Colours' immersive experience currently touring Japan.

Gaming too is evolving into the metaverse, with significant investment from Japan's major corporations. The 'Japanese Metaverse Economic Zone' was announced in February 2023. Known locally as the *Ryugukoku,* the agreement between Mitsubishi, Fujitsu and others will see the development of a metaverse infrastructure to 'update Japan through the power of games'.

End users will have the chance to engage in the metaverse through role-playing game (RPG) characters, who will be able to participate in different virtual worlds and move across realms in the metaverse.

It remains to be seen how large or significant the user base for the Metaverse Economic Zone will be. Despite an estimated US$1.3 billion of AR and VR-related market spend in Japan in 2019, the penetration rate of home VR equipment across Japan was estimated to be just 6%.

New forms of creative entertainment originating in Japan are connecting with the next generation of international audiences

These include the growing popularity of Virtual YouTubers (or 'VTubers'). VTubers are online avatars created and animated using computer graphics and motion capture software from

[31] https://www.artsper-for-galleries.com/blog/the-japanese-art-market-under-rapid-expansion

[32] https://www.artsper-for-galleries.com/blog/the-japanese-art-market-under-rapid-expansion

[33] https://corporate.pia.jp/news/detail_live_enta20220615.html

companies such as Live2D, often reflecting Japanese pop-culture and aesthetics, such as anime and manga. This popularity of this form of entertainment with Japanese audiences and creators has prompted significant innovation in desktop motion capture technologies and engendered a number of specialised tech companies and VTuber agencies.

While VTubers begun as a primarily Japanese phenomenon with the breakout success of Kizuna AI in 2016, since 2020 this type of content has attracted growing international audiences, leading to the establishment of English and Chinese-language platforms and virtual creators.

More recently, some VTubers have introduced artificial intelligence into the design of their characters using AI-generated art and have even integrated AI into their core personality, gameplay, and chat interaction.

Despite growth in the content industry, Japan's share of the global market is decreasing.

While gaming has been a major engine for the growth of Japan's content industry, according to Japanese government statistics Japan's share of the global content market is in decline. This is largely driven by a decrease in Japan's share of the global publishing market, which fell from 40% of the global market in 2014 to 30% in 2023.[34]

Japanese cultural exports have also stagnated following a period of rapid growth in the 1990s and early 2000s. This is in contrast with South Korea, which has seen an explosion in the global demand for South Korean cultural content. It is also not known what impact Japan's shrinking and aging population will have on the production and consumption of cultural goods and services.

4.2 Japan's policy and investment environment

4.2.1 Strategic objectives

Japan's CCIs policy over the past decade has been less interventionist than that of South Korea and Hong Kong.

Cultural and creative industries policy in Japan is set in large part by two government bodies: the Agency for Cultural Affairs, an independent agency under the jurisdiction of the Ministry of Education, Culture, Sports, Science and Technology with responsibility for promotion of the arts and preservation and activation of Japanese heritage; and the Ministry of Economy, Trade and Industry (METI), which has among its primary responsibilities the promotion and export of Japan's content businesses such as animation, screen, games, video and music industries as well as fashion and design.

The sector also receives support from other government bodies, such as the Ministry of Internal Affairs and Communications (MIC) and the Japan Science and Technology Agency (JST, see section 4.2.2).

The creative industries in Japan were officially recognised by the government in 2010, with the foundation of the Creative Industries Promotion Office under METI. Creative industries policy is closely linked to the government's 'Cool Japan' nation-branding campaign, which uses

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Japanese cultural products to promote the nation overseas. The strategy recognises the economic potential of the internationalisation of Japan's cultural goods and products. It is focused on export rather than cultural production.[35]

Despite a lack of a comprehensive policy targeting the CCI sub-sectors in Japan at municipal and national levels,[36] Japan remains in the top ten countries worldwide for the export of cultural goods.[37] This international success is attributed to Japan's advances in new technologies, gaming and anime.

Much of the growth of Japan's creative content industries has stemmed from the efforts of creators and corporations, which have played a similar 'state-support' role in raising the sector's visibility internationally.

Digital innovation in the arts is identified as one of Japan's cultural policy priorities.

The Japanese government is currently revising the Basic Plan on the Promotion of Culture and the Arts, which will update the policy for the first time since 2018. The draft version of the revised plan lists 'digital innovation for arts and culture' as one of seven priorities.

The Plan acknowledges the impact that rapid technological advances and the diffusion of AI and Web 3.0 technologies are having on the creation and dissemination of cultural products. It commits to responding with initiatives to 'protect and utilise the value of culture and art', such as copyright systems, digital archives and NFTs.

It is significant that the Plan seeks not only to promote culture and art made with digital technologies, but to 'clarify the challenges' arising from the speed of digital transformation, calling on different ministries and government agencies to work together to 'grasp the changes in the situation'. The major focus of the policy is the protection of rights and intellectual property for artists and creators working in a rapidly changing environment.

It also commits to closer cooperation between culture and the arts and science and technology, through research institutions and funding support, as well as highlighting the potential of digital technologies to both preserve and widen access to Japan's cultural heritage.

These proposed policy directives represent progression from the first Basic Plan, in which arts and technology was not a major focus. Previous policy was centred around support for and promotion of the **Japan Media Arts Festival**, which for 25 years between 1997 and 2022 was the Agency for Cultural Affairs' flagship initiative in the field of arts and technology.

'Media arts' when used by the Agency for Cultural Affairs describes artistic and cultural products 'using films, cartoons, animation and computers and other electronic devices' and digital technologies.[38]

The Agency for Cultural Affairs recently announced that it will no longer fund the Japan Media Arts Festival. Instead, the Agency launched a web-based database called *Media Arts Current*

[35] Some observers have called for greater balance in support for promotion and production. See: Christian Morgner (2018), Governance and policy development of creative and cultural industries in Japan from: Routledge Handbook of Cultural and Creative Industries in Asia Routledge; Daliot-Bul, M. (2009) Japan brand strategy: The taming of 'Cool Japan' and the challenges of cultural planning in a postmodern age. Social Science Japan Journal, 12(2): 247–66.

[36] Iwabuchi, K. (2019), *Cool Japan, Creative Industries, and Diversity,* ERIA Discussion Paper Series No. 287

[37] http://data.uis.unesco.org/Index.aspx?DataSetCode=CTRD_DS

[38] Article 9 of the Basic Law on Culture and the Arts

Contents (MACC) in February 2023. As well as covering information on events relating to media arts, the site seeks to act as an archive of Japanese media arts, past and present.

Between June and August 2022, the Ministry of Economy, Trade and Industry (METI), which has responsibility for the promotion, export and dissemination of Japanese cultural goods and services, convened a 'Study Group on Art and Economic Society' which included an expert panel looking at 'Art and technology'. At the time of writing, the outcomes of this exercise are yet to transpire, but may impact future policy.

Media Arts are also recognised in central government strategies beyond those from the Agency of Cultural Affairs.

In addition to the Basic Plan on the Promotion of Culture and the Arts, the 2022 Intellectual Property Promotion Plan by the Prime Minister's Office outlines the need to invest in improving the skills of creators and professionals involved in the production, and of manga, animation, games, and other media artworks when it comes to preserving and exploiting IP. It commits to the development of educational programmes at various research institutions.

Another government strategy, the Cabinet Office's 2022 Basic Policy on Economic and Fiscal Management and Reform commits to undertaking 'necessary studies' into the concept of a National Centre for Media Arts. Such a centre was initially planned in 2009, but later abandoned due to a change of government.

4.2.2 Public funding

There are a range of public support programmes which have supported Media Arts projects in Japan, although only a small number specifically target arts and technology projects.

In recent years, the Agency for Cultural Affairs has had three key funding initiatives in the field of Media Arts. These are the:

- Project for the Global Development of Media Arts: funding to support the overseas development of award-winning works from Japan Media Arts Festival (the future of this programme is uncertain given the Agency will no longer support the festival).

- Project for the Promotion of the Development of the Infrastructure for Media Arts Cooperation: funding to support cross-sector networking, preservation of media arts works, capacity building and knowledge sharing.

- Grants for Promotion of Media Arts Archive: an open call to support creators to archive Media Arts content.

Over the coming year, the Agency for Cultural Affairs earmarked ¥112 million yen for the promotion of Media Arts in its 2023 budget request.

Other Agency schemes, such as the **Japanese Art Global Development Promotion Scheme** and the **Cultural and Art Creation Centre Formation Project**, have been used to support Media Arts projects, although they do not exclusively target digital and media initiatives.

Other public funding programmes supporting arts and technology initiatives include:

- METI subsidy for the Promotion of Overseas Expansion of Content and Strengthening of Infrastructure (commonly known as J-LOD) has a scheme to support 'projects that develop and demonstrate systems that contribute to digital transformation in the content industry'.

- The Japan Foundation also subsidises the overseas development of media art within the framework of its 'Overseas Dispatch Grants' and 'Overseas Exhibition Grants', although support is not specific to media art.

- Arts Council Tokyo's Arts and Culture Attractiveness Creation Grant supports artists and creators to 'pursue and explore new ideas and expressions that integrate digital technology and science with arts and culture' and those that 'may lead to the development and proposal of new technologies'. Applicants working on digital projects are eligible for additional support of ¥3 million on top of the standard grant limit of ¥20 million.

- The Japan Science and Technology Agency (JST) is a government agency which aims to build infrastructure that supports knowledge creation and dissemination in Japan. The Agency funds interdisciplinary research projects, including those which address both scientific and artistic innovation, such as the *xDiversity* programme, which funds research into technologies which widen access to arts and entertainment for people with disabilities.

- The Ministry of Internal Affairs and Communications (MIC) has invested significantly in Japan's digital infrastructure and 5G networks, including through the flagship Digital Garden City Nation Initiative, which aims to level inequalities in connectivity between rural and urban areas. The Ministry's Global Promotion Action Plan 2025 also identifies the overseas promotion of Japanese content through multilateral channels as a priority.[39]

4.2.3 Private investment

Japan's corporations and manufacturers also play a key role in the arts and technology funding ecosystem.

Japanese corporations support the advancement of arts and technology projects, both through philanthropic grants and foundations funding artists and creators, and through funding more commercially-focused R&D projects.

Grant and scholarship programmes in arts and technology and/or Media Arts include the following:

- Cygame, affiliate of the major IT human resources company CyberAgent, offer a 'Game Creator Scholarship'.

- The Kozuki foundation, founded by the family behind entertainment conglomerate Konami Group, offers 'Creator Development Grants'

- The Kuma Foundation "Creator Scholarship", founded by COLPOL Inc. in 2008, offer creator scholarships for under-25s as well as project-based grants for Foundation Scholars

In addition, Japanese companies support arts and technology through the provision of cultural venues and spaces for the development and exhibition of creative works. The Panasonic Connect XR Lab is described in more detail below, but the Inter Communication Centre

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established by telecoms corporation NTT and the forthcoming Center for Cultural Innovation currently being developed by the East Japanese Railway are also important examples.

4.3 Japan's arts and technology ecosystem

4.3.1 R&D Labs

Japan is home to high-profile research labs which play an essential role in advancing the country's arts and technology sector.

These labs are typically led by professors, many of which are both researchers and artistic practitioners, alongside graduate students, postdoctoral researchers, and technical staff who work together to conduct research into specific arts and technology fields. Indicative labs relevant to this research include:

- Computational Creativity Lab (Nao Tokui Lab) at Keio University, exploring the 'art, science, philosophy and engineering' of computational systems

- Ishiguro Lab at Osaka University, which is pioneering avatar robotics systems

- Yasuyuki Kakehi Laboratory at the University of Tokyo undertakes research around human computer interaction, particularly in terms of augmented reality and non-screen based experiences

- Takashi Ikegami Lab at the University of Tokyo, an 'artificial life' lab looking at genetic codes

- Kouta Minamizawa Laboratory at the Keio University is exploring future media technologies based around haptics and embodied physical interaction

- Yoichi Ochiai Digital Nature Laboratory at the University of Tsukuba, investigating the use of digital technologies in natural settings

There are many examples of labs working in collaboration with cultural organisations and venues on arts and technology projects, both nationally and internationally.

For example, in 2021, the Embodied Audiovisual Interaction (EAVI) unit at Goldsmiths, University of London, collaborated with the Takashi Ikegami Lab to produce an AI-based artwork that was premiered at the *Barbican's AI: More Than Human* exhibition.

Deep dive: xlab, University of Tokyo

Yasuaki Kakehi Laboratory – or xlab –is a research institution based at the University of Tokyo Graduate School of Interdisciplinary Information Studies. The lab is led by engineer, researcher and artist Professor Yasuaki Kakehi.

Professor Kakehi started his career researching XR, projection mapping and image processing, however as time went on, he became increasingly interested in ways to develop new, interactive experiences where the user 'stays' in the physical world.

He begun to shift his research focus from extended realities to objects and materials and their artistic and experiential potential, exploring new ways of human-computer interaction that do not require the use of a monitor, a concept the lab calls 'Material Experience Design'.

In the mid-2000s, Kakehi started artist collective and design studio *Plaplax* before founding xlab in 2008. Since then, he has produced and designed works that have exhibited all over the world, including at festivals such as Ars Electronica and Japan Media Arts Festival.

His work not only pushes technical boundaries in material behaviour but explores emotional reactions to this materiality. The lab uses a range of different technologies to manipulate materials, from electromagnets to ultrasonic sound and liquid-based kinetic projects, as well as researching the way that humans interact and respond.

At the same time, the Kakehi is interested in broader applications of the lab's research, and the possible applications of Material Experience Design to other sectors, such as health and education.

While there is what Kakehi describes as a 'time lag' between the technologies they are pioneering and the ways it will be used commercially – xlab is focused on 'near future' scenarios – the lab works in partnership with companies and artisans to better understand what these use cases might look.

Partners range from large fashion, ecommerce and electronics companies, some of which also provide funding for the lab, to small craft workshops who have been working using centuries old traditional Japanese techniques. xlab also receives around half of its funding from government support.

In this way, like many of Japan's leading R&D labs, xlab is truly interdisciplinary, combining engineering and scientific work with both practical and artistic outputs. Some projects result in research papers, others in artistic works, and some projects result in both in a feedback loop of ideation and creation. For Kakehi, his work is as much about creating new experiences as it is more traditional research outputs.

The make-up of researchers in the lab also cuts across disciplines. It employs many graduate students, approximately half of which are from arts and humanities backgrounds while the other half come from engineering or science backgrounds. Some researchers at the lab are working students from major tech and engineering companies.

The lab also offers opportunities for study and exchange for international researchers and artists. It has strong relationships with MIT Media Lab and Ars Electronica and is currently in conversations with UAL and the RCA in the UK. Kakehi says they are always looking to expand their networks and find new partners with whom to connect and collaborate.

Overall, the way xlab works with partners is representative of the wider role Japan's leading R&D labs play in the country's arts and technology sector, collaborating across institutional, governmental and corporate sectors, often at the forefront of both new technology and artistic practice.

4.3.2 Higher education

Japan has a long tradition of interdisciplinary education and is home to well-established courses in Media Arts and art and technology.

Many of the country's most prominent digital and media artists graduated from these interdisciplinary arts and technology courses.

While most courses are taught in Japanese, increasingly departments are also running English-language courses for international students.

Institution	Details
University of Tokyo, Interdisciplinary Information Studies Department	Some of Japan's leading informatics scholars and artists, such as **Yoichi Ochiai,** graduated from the school's **Emerging Design and Informatics Course** – an interdisciplinary course covering media arts and digital content; spatial design and simulation, and robotics and interfacing. Following a grounding in core technologies, students go on to study a range of other topics, including humanities and social sciences, in order to give students a wide interdisciplinary understanding.
IAMAS (Institute of Advanced Media Arts and Sciences)	A graduate school in Gifu Prefecture that combines art, design and technology, supporting students to produce original work while developing practical skills in a variety of fields. It is attached to the **Research Centre for Industrial Culture (RCIC)**, which undertakes creative R&D. Alumni of the Institute include media artists **Ryota Kuwakubo, Taro Yasuno** and **Masahiro Miwa**.
Tama Art University, Department of Information Design	The University defines Information Design as 'creating art and culture out of shapeless information'. The Department offers courses in 'art and media' and 'interaction design'.
Kyoto City University of Arts, Faculty of Fine Arts, Concept and Media Planning course	The interdisciplinary course aims to develop students' interpretation of contemporary human experience through various media.
Musashino Art University, Department of Design Informatics	The Department marries arts-oriented education with design understandings of information architecture and design informatics approaches.
Osaka University Graduate School	In addition to develop students' practical media development and processing skills, the MA Arts and Media seeks to develop understandings of media and cultural theory, encouraging them to think critically about new technologies.

4.3.3 Venues and infrastructure

Venues dedicated to arts and technology have been a feature of Japan's cultural infrastructure for decades.

The longest-standing of these venues is the **NTT Inter Communication Centre (ICC)**, established in 1997 by telecoms corporation NTT East to commemorate the centenary of the telephone business in Japan. It has since become an important hub for media arts exhibition and development in Japan and has often pushed boundaries of traditional exhibition formats. In addition to exhibiting works, the ICC runs programmes such as workshops, performances, symposia, and publications looking at technological innovation.

Another institution, the **KDDI Museum**, also known as the KDDI R&D Laboratories Museum, is an exhibition space established by the KDDI Corporation, a telecommunications company, to showcase advancements in technology and telecommunications.

The **National Museum of Emerging Science and Innovation,** known as the **Miraikan** or 'Future Museum', was opened in 2001 by Japan's Science and Technology Agency. In addition to permanent scientific exhibitions, the museum has programmed special exhibition highlighting the intersection of arts and technology, including an Android Opera performance from Alter and a large-scale TeamLab installation.

In 2022, **Civic Creative Base Tokyo** (CCBT) opened with support from the Tokyo Metropolitan Government. The CCBT has labs, studios and spaces for education and exhibition, and is intended to be a hub for public engagement in digital technologies, a venue for artistic programming and to encourage innovation in the city.

In 2026, the **Center for Cultural Innovation** is due to open as part of the Takanawa Gateway City development being overseen by the East Japan Railway. The centre will be led by Maholo Uchida, ex-curator at the Miraikan and a leading figure and creative programmer in the arts and technology field.

Outside of Tokyo, the **Yamaguchi Centre for Art and Media,** known as YCAM, is a cultural institution dedicated to promoting art, technology, and media. Established in 2003, it has played an important role in Japan's arts and technology ecology. The centre programmes exhibitions, performances, and events, as well as educational courses and artist residencies. YCAM also houses a variety of cutting-edge equipment and facilities, including a digital cinema, a sound studio, and a motion capture studio, which are available for use by artists and researchers.

While they do not exclusively programme digital and media arts, **Mori Art Museum,** the **Museum of Contemporary Art Tokyo** and the **21st Century Museum of Contemporary Art Kanazawa** have all programme significant exhibitions showcasing arts and technology.

4.3.4 Festivals and events

Japan has a dynamic and growing international festival scene, providing key platforms for international exchange.

Japan's northernmost city Sapporo is the only city in Japan to be designated a UNESCO City of Media Arts. In 2014, the city launched the **Sapporo International Arts Festival**, a media arts festival hosted every three years. It is currently directed by artist and curator **Hideaki Ogawa**,

Director of **Ars Electronica Japan**. The next iteration of the festival will be held in February 2024, with the theme 'Last Snow' and will feature 'ground-breaking ideas at the intersection of art, technology and science'.

The following year in 2025, Osaka will host a World Expo, organised and sanctioned by the Bureau International des Expositions (BIE), on the theme 'Designing Future Society for Our Lives'. **Osaka Expo** will host eight themed pavilions showcasing Japanese creativity and innovation. Pavilions will be programmed by some of the country's leading media artists and technologists, such as robotics professor **Hiroshi Ishiguro** and artist and researcher **Yoichi Ochiai.**

The UK pavilion and associated UK delegations to the Expo will provide a key opportunity for UK arts and technology innovators to encounter and collaborate with their Japanese counterparts.

Launched in 2021, **Beyond the Frame Festival** was Japan's first XR international film festival, showcasing cinematic extended reality works from around the world. The festival is the result of a collaboration between CinemaLeap Inc and the Odakyu Electric Railway Co. Ltd and is hosted in Shinjuku, Tokyo. The festival forms part of Odakyu Electric Railway's efforts to revitalise the area through digital culture.

The festival has programmed events in collaboration with music festival **MUTEK Japan,** which was originally established in Montreal, Canada, but has since expanded around the globe. The festival was initiated by MUTEK's founder, Alain Mongeau, and a team of Japanese partners, who recognized the vibrant electronic music and arts scenes in Tokyo and the potential for a MUTEK festival to thrive there.

The festival programmes innovative digital art and music – the most recent edition included multidisciplinary works using motion sensors, 3DCG animation, AR and the audio-visual performance *Afflatus Spectrum*, a collaboration between AI and humans from duo **Reo Anzai** and **Santa Naruse**, both members of Nao Tokui's **Computational Creativity Lab** at Keio University.

In its seventh year, **Theatre Commons Tokyo** is pioneering the use of advanced technologies including AR, VR and metaverse technologies in the performing arts – see deep dive case study for more details.

Internationalised festivals and events should therefore be considered by UK artists and practitioners as important entry points into Japan's arts and technology sector.

Deep dive: Theatre Commons Tokyo festival

Festivals and events have played a key role in the development of Japan's arts and technology sector, acting as catalysts for collaboration and production of new works. Theatre Commons Tokyo performing arts festival, now in its seventh year, is a key example of the way in which these events can create space for dialogue, experimentation and cross-cultural communication.

The festival refers to itself as a 'collective space to harness the wisdom of theatre'. The 2023 festival was built around the theme 'Rebooting Touch' – an acknowledgement of the limits on contact throughout the pandemic, as well as the opportunities for new kinds of contact bought about by advanced technologies.

The festival programme featured performances, installations, workshops, as well as remote participation options that included a work set in the Metaverse.

The flagship performance was **Meiro Koizumi's Prometheus trilogy,** a set of three works that utilize AR and VR technologies to explore the myth of Prometheus, who stole fire from the heavens and bestowed it upon humanity. Koizumi uses the myth to symbolise the tensions between humans and technology that are brought to the fore with rapid technological advancements and uses VR to destabilise participants' sense of touch and relation to their own bodies.

The production of the trilogy offers an insight into the different players involved in Japan's arts and technology ecosystem: following its conception by dramaturge Meiro Koizumi, the VR elements were produced by tech company **Rhino Studio** with input from **Professor Masayuki Okahara** and his laboratory at **Keio University** into the different approaches to perception in the visual representation of the work.

The festival received financial and non-financial support from a range of national and international bodies. These included Japanese government bodies the Agency for Cultural Affairs, Arts Council Tokyo and Tokyo Metropolitan Foundation for History and Culture, as well as diplomatic institutions such as Goethe-Institut Tokyo, Institut français du Japon, the Taiwan Cultural Center and the Embassy of the Kingdom of the Netherlands, which helped by providing venues and inviting artists. Representatives of these organisations also participate as festival organising committee members.

In this way, the festival is not only a space to push technological and artistic boundaries, but an important platform for international collaboration and exchange between Japan and the rest of the world.

Theatre Commons is produced by **Chiaki Soma,** an established theatre producer who has worked across Japan and internationally. Reflecting on her decision to work with Koizumi for the Theatre Commons 2023 festival, she cites two key reasons. Firstly, Soma felt that the use of VR in the works critically examined the physicality of the performing arts in a way that many other entertainment-based VR productions in Japan failed to do.

The second was more practical – Koizumi was part of only a small group of performing artists in Japan who had been working with VR, AR and metaverse technologies prior to the pandemic, and was therefore in a position to prioritise this tech within the festival programme.

Soma acknowledges that the market for performing arts productions that utilise virtual reality in Japan is still tiny, with cost, hardware and digital literacy considerations acting as barriers to mainstream uptake.

However, she hopes that Theatre Commons 2023 will have played a small role in advancing the development of the sector and highlights the support that was available from both government and tech manufacturers that helped the festival and the artist to overcome some of these barriers. These include grants and subsidies from Arts Council Tokyo and METI which recognised the innovative elements of the productions, alongside support with equipment from the Japanese subsidiary of Taiwanese smartphone manufacturer HTC.

Soma also notes the potential for international collaboration offered by VR productions. She describes commissioning and producing a VR production for the 2021 edition of the festival – which took place entirely online – with German Director Susanne Kennedy, despite having never met face-to-face. She observes that the lack of necessary travel spend can be advantageous when production budgets are tight.

In future, Soma hopes that the festival and her work can play a role in widening and diversifying audiences for VR theatre, which tend to have a greater representation of men and 'over 40s' than other Japanese performing arts performances.

Over the summer, Soma will take works by Koizumi and Saeborg that first premiered at Theatre Commons festival to Theater der Welt in Germany, alongside other technology-based artworks she has created over the past five years with Japanese and international artists.

Image credit: Arts Council Tokyo

4.4 Artists and Cultural Producers

Japan's global strengths in technology are changing modes of creation, production and curation.

The country is home to some of the most advanced technology researchers and manufacturers in the world, which have significant influence on the way cultural works are produced.

For example, developments in AI have seen Japanese musicians and sonic artists pioneer ways to produce and perform music, while advances in biotechnology have spurred significant interest and activity at the intersection of arts, science and the natural world, known as 'bioarts'. Much of this work is at the forefront of global scientific understanding and is prompting artists to ask fundamental questions about what it means to be humans through their work.

In addition to household names such as Sony, Panasonic and Epsom, Japan also has a thriving culture of creative SMEs collaborating in dynamic ways with artists, researchers and cultural institutions.

4.4.1 Technology and artistic practice

Artificial intelligence (AI)

A distinctive feature of Japan's cultural ecosystem is the way Japanese audio artists and producers have embraced the potential of AI to generate new musical forms and modes of performance.

Qosmo is an 'AI creativity and music lab' which develops AI tools for artists and companies. They rose to prominence with their 2018 *AI DJ Project,* which saw an AI DJ play 'back-to-back' alongside a human DJ, selecting and mixing songs in real time in response to its human counterpart. The 2023 instalment of the project, *Emergent Rhythm,* is an audio-visual DJ performance using real-time AI-generated audio and images.

Yasunao Tone is a multi-disciplinary artist born in Tokyo and was an important figure in post-war Japanese art in the 1960s. His 2016 project, AI Deviation, was a collaboration with UK researchers at the University of Surrey. The project simulates Tone's performance using artificial intelligence, which is used to generate outputs and virtual Tone performers. During performances, Tone interacts live with AI versions of himself.

Another Live was an interactive, browser-based experience of a live performance in the forest from musical artists **KOM_I and Oorutaichi** – collectively **YAKUSHIMA TREASURE** - produced in collaboration with creative agency **Dentsu Craft Tokyo** and film director Koichiro Tsujikawa. The performance was captured using 360-degree infrared light and 3D point group data, depth sensors and 360-degree microphones.

At the same time, artists in other fields are using their work to ask questions about what the rapid development of AI means for society.

Tomo Kihara is an artist and game developer that designs and codes 'toys for thought' — games and urban interventions that invite the public to explore socio-cultural issues through play. In 2023 project *Deviation Game*, humans are tasked with outwitting artificial intelligence by expressing human concepts in a way machines do not understand, exploring human creativity

and deviation from social norms. The work was recently exhibited at games festival Now Play This in London.

In partnership with Qosmo, **Dentsu Lab Tokyo** (a sister lab of Dentsu Craft) created *Unlabelled,* a textile label which produces garments and accessories with 'Adversarial Patch' patterns, making the wearer less recognisable to AI and facial recognition technologies.

Immersive

Japan has produced some of the world's most well-known artists of immersive installations and works.

In addition to being home to some of the world's leading manufacturers of advanced projection technologies, such as Panasonic, Sony and Epsom, Japan's immersive artists have achieved global recognition.

Interdisciplinary artist collective **TeamLab** exhibit their immersive installations, which are intended to encourage people to connect with and appreciate the beauty of nature, across the world – including at London's Victoria and Albert Museum - and have enjoyed significant commercial success. The collective is soon to open a new permanent premises in Tokyo, supported by real estate corporation MORI, after TeamLAB Borderless in Odaiba closed in 2022.

Between 2006 – 2021, Tokyo-based **Rhizomatiks** produced large-scale immersive artworks and performances that were exhibited internationally, using advanced projection and projection mapping technologies. Rhizomatiks' works often collaborated with dance and performing arts group **ELEVENPLAY.** The company has since rebranded as Abstract Engines, continuing to work in the same space.

Bioarts

Technological advances have enabled new ways to interact with natural material and phenomena – and with them, new ethical and moral questions.

Bio-artistic practice has taken place in Japan since the 1980s, although biotech advances in the last decade have created new opportunities for artistic expression.

High-profile works include **Ai Hasegawa's** (IM)POSSIBLE BABY, which uses DNA and computer simulators to ask questions about the social, cultural and ethical implications of emerging biotechnologies that could enable same-sex couples to have their own, genetically related children. The work generated significant debate on its release.[40] Another of Hasegawa's works, the 'Anti Bias Gun', uses facial recognition data to assess the likelihood of the person in front of the gun being subject to police violence. Hasegawa is a graduate of London's Royal College of Art's Design Interactions Course.

Hideo Iwasaki, Professor in the Department of Electrical Engineering and Bioscience at Waseda University founded **metaPhorest,** a biological art and 'bioaesthetics' platform that hosts artists and biologists interested in the aesthetics of biological phenomena. Much of

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[40] https://aihasegawa.info/impossible-baby-case-01-asako-moriga

Iwasaki's work focus on cyanobacteria and microscopic organisms, and comments on a wide range of social and scientific issues.

Also using living organisms in her work, musician, composer and artist **Etsuko Yakushimaru** won the Prix Ars Electronica Gala in 2017 for converting her pop song *I'm Humanity* into DNA, exploring its potential as recording media.

The rise of biotechnology has promoted the foundation of **BioClub**, an active community of researchers, creators, companies, and citizens based in Tokyo. BioClub programme a series of talks and workshops on related topics – often from the perspectives of arts and culture.

Bioarts asks questions not only of the relationship between nature and technology, but also between artistic works and their exhibition. Curators such as **Yosuke Takahashi** have carved out a specialism curating bioart exhibitions and addressing the practical and legal implications of displaying living material.

Robotics

Japan has long been a global leader in robotics technology and has developed advanced robotics for manufacturing and healthcare.

The last decade has also seen the use of 'avatar' robots into Japan's communications, hospitality, and entertainment industries.

In Japan's cultural sector, perhaps the most high-profile of these avatar robots is '**Alter'** – an android robot that has conducted the 'android opera' *Scary Beauty,* composed by Keiichiro Shibuya, in some of Japan's major performing arts venues. The opera has also toured internationally – including at London's Barbican Centre.

The project is a collaboration between pioneering robotics lab, **Ishiguro Lab** at Osaka University, led by Professor Hiroshi Ishiguro; pioneering artificial life lab, **Takashi Ikegami Lab** at the University of Tokyo; digital entertainment company MIXI Inc and Warner Music Japan.

4.4.3 Tech companies and creative businesses

Japan is home to global leaders in electronics manufacturing as well as a vibrant culture of small and medium-sized creative studios.

Major electronics manufacturers and corporations play an important role in the country's arts and technology ecosystem, producing leading edge hardware as well as investing in R&D, increasingly in collaboration with artists and creators.

For example, **Panasonic Connect's XR Lab** is described as a 'co-creative space' for the development of new immersive narratives. The Lab uses Panasonic hardware and technologies including hologram, spherical mapping, AR and VR, working with creators and commercial clients (see case study for more details). Similarly, **Sony's Kiyosumi Shirakawa Base** in Tokyo is production studio and creative R&D hub which uses virtual and motion capture technologies.

In addition to larger corporations, smaller to medium size enterprises also contribute significantly to the dynamism of the arts and technology sector in Japan.

These include creative studios such as **Whatever, Dentsu Lab, annolab, NAKED Inc** and **THINKR:** teams of artists, creatives, academic researchers, software and games developers

and marketing executives producing a range of technical and creative projects – often in collaboration with other artists, research institutions and companies.

Other studios such as **Nomena** are working at the intersection of architecture, urbanism and arts and technology. Alongside major commissions such as the design of Tokyo's mechanical Olympic cauldron, the studio produces artworks and installations that have been exhibited in major museums and galleries – inlaying London Design Festival. Their installation '*The Square Makes It Through*', which combined mechanics and CG animation to represent society's invisible rules and barriers, was awarded an Art Division Excellence Award in the 2021 Japan Media Arts Festival.

4.4.2 Accessibility

Japanese artists and researchers have been exploring ways to make the creative industries more accessible to people with different needs.

These include the **JST**-funded *xDiversity* programme, which funds research into technologies which widen access to arts and entertainment for people with disabilities.

As part of the programme, media artist and head of the **Digital Nature Laboratory** at the University of Tsukuba **Yoichi Ochiai** and his team have worked on a series of software and hardware tools to help people who are deaf and hard of hearing both consume and create musical and live performances, using captioning and advanced vibration capabilities.

Image credit: Credit: Jürgen Grünwald / Ars Electronica

Deep dive: Panasonic Connect XR Lab

A decades-long leader in electronics manufacturing, in recent years, Panasonic has built up particular expertise in location-based entertainment. The company has worked with leading cultural institutions, brands, rights holders and media companies to produce interactive, multi-sensory experiences. This covers a wide range of cultural and commercial environments: galleries and public spaces, but also hotels, retail destinations, theme parks and sports arenas.

The Frameless attraction is probably the best-known instance in the UK, with Panasonic technologies enabling an immersive experience in which masterpieces of western art are projected across four galleries at a permanent venue in central London. Panasonic have collaborated on site-specific, temporary shows at some of the world's most iconic events and landmarks, including Dubai Expo, the Colosseum in Rome, the Eiffel Tower and Tokyo Olympics.

Panasonic's reputation is in large part based on the traditional strengths of the company, which began a century ago as a manufacturer of lamps and light fittings, before becoming well known in the later twentieth century as a producer of audio equipment, display screens and cameras.

This long-standing expertise and extensive research and development capacity has provided the foundations for their proficiency in a range of technologies that enable the creation of immersive, location-based arts and entertainment experiences. These include near-instantaneous motion tracking, ultra-low latency, spherical mapping, holographic projections and interactive environments.

Central to the design and production of these experiences is Panasonic's XR Lab in Shinonome,Tokyo. This is described by Chad Kunimoto, Panasonic's Global Business Development Manager for Immersive Experiences as "a co-creative space where new ideas for immersive storytelling are proposed."

The Lab's emphasis is more on spatial design rather than hardware or technical facilities. The Lab has an in-house team of more than a hundred designers and audio-visual engineers who work with creatives (visual artists, film makers, content producers) to develop the early visualizations of their ideas, and take them through to become fully produced, location-specific experiences – a process that Kunimoto describes as 'glass to glass' content production, and which makes use of a suite of Panasonic devices, tools and systems.

Panasonic XR Lab is not a commissioning body and does not provide sponsorship, but it does seek to contribute to projects and can provide facilities and expertise for more arts-led projects. They will consider collaborations that do not have wholly commercial objectives, but which can contribute to expanding the use of the tech, while also helping to stimulate technological development and innovation.

An instance of this was the collaboration with Rhizomatiks, the Japanese arts collective that has pioneered cross-disciplinary arts, media and technology projects, and also ELEVENPLAY, the dance company similarly well known for incorporating technology in its performances. The result was an exhibition at Tokyo's Museum of Contemporary Art in Tokyo, which captured the movement of dancers, using the data to generate visual arts projections that synchronised with the live performance.

The project – and the Lab – is illustrative of the way in which commercially or corporation-driven creative R&D in Japan influences the arts and technology sector, both in terms of skills development, and the tools that Japanese artists and creatives have at their disposal.

Panasonic actively seeks out new partnerships and creative collaborators. This is partly achieved through a long-standing presence at the world's major media and technology trade shows, as well as more cultural festivals such as SXSW.

The company also runs its own roadshows and tech days in which it showcases prototypes and forthcoming products. Alongside this promotion and mainstream entertainment industries, there is also a desire to work with artists, independent producers and film makers and small businesses that are undertaking new and distinct creative work.

Kunimoto acknowledges that it can be difficult to identify and engage with such emerging talent, and that cultural agencies such as the British Council are important in helping to bring them to their attention and facilitate these connections.

A particular interest for Kunimoto is how immersive experiences can contribute to social and environmental goals. Within Panasonic, and Japanese business in general, there is heightened awareness and emphasis on the climate crisis, and also the principles of diversity, equality and inclusion.

The kinds of projects being developed at the XR Lab offer ways of tackling these issues – for instance, as was showcased at Expo 2020, immersive experiences are a powerful way of simulating natural environments without the need to visit them, and of conveying the impact of ecological damage. Chad Kunimoto would welcome the opportunity to work with artists and storytellers from around the world to work on these kinds of creative projects that are so urgently needed.

Image credit: Panasonic Connect

5. South Korea

5.1 South Korea's creative sector and market

5.1.1 Cultural and creative industries overview

South Korea is a globally important market and producer for the creative industries.

According to the OECD, South Korea has 2.6% of the global market share for the creative industries, making it the seventh-largest market in the world in 2018, and generating about USD$ 114 billion in sales[41].

South Korea is much than a market for global content. The Academy Award winning success of the film *Parasite* brought global attention to Korean film, but content production in the country has been undergoing rapid growth for some years, with Korean dramas increasingly popular on platforms such as Netflix. In the five years leading up to pandemic, Korean cultural content exports rose in value from US$ 5.2bn in 2014 to US$ 9.5bn in 2019, an annual growth of 16%[42]. The recent *Hallyu! The Korean Wave* exhibition at the V&A museum is testament to the recognition and interest in Korean culture in the UK. As Tristram Hunt, the Director of the V&A, writes in the foreword to the accompanying book[43], the exhibition "posits Korea as a leading cultural powerhouse in the era of social media and digital culture."

A recent study[44] by the Korea Creative Content Agency showed that, in the course of the Covid-19 pandemic, attendance at live performances understandably dropped dramatically and (at the time the study was published) yet to fully recover. At the same time, the digital consumption of creative content (video, music, games, e-book, webtoon etc) increased, with the average Korean consuming up to four hours a day of such content.

The major beneficiaries were global video platforms such as Youtube and Netflix, and the Korean online streaming service Naver TV. There was also a substantial increase in uptake for Naver's social media network Zepeto, which has a focus on K-pop and fashion and is competing with the established US companies for the Asian youth market.[45]

5.1.2 Market trends

Video Games and Esports

South Korea has long been a major market for video games and is the fourth largest national market in the world[46], with online and multi-player games particularly popular.

It is estimated that Korean spend on average 49 minutes playing mobile games daily[47]. This is thought to be the longest time spent on mobile gaming in the world, and attributable to the high numbers of smartphone users.

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[41] https://www.oecd.org/country/korea/thematic-focus/cultural-and-creative-sectors-1573f603/

[42] Figures from Korea Content Creative Agency, http://www.businesskorea.co.kr/news/articleView.html?idxno=34464

[43] https://www.vam.ac.uk/exhibitions/hallyu-the-korean-wave

[44] This study is not available in English, its translated title is: 'Research on Trends in Content Use in the era of Digital Transformation" (2021)

[45] https://www.ft.com/content/14c88e84-f3c8-485e-a9df-31ead34e48f0

[46] https://www.globaldata.com/data-insights/technology-media-and-telecom/market-size-of-video-gaming-in-south-korea/

[47] https://iuk.ktn-uk.org/wp-content/uploads/2020/12/0477_KTN_GEM_SouthKorea_ImmersiveTechnologiesGTR_final.pdf

A distinctive feature of the Korean market is the size of its professional gaming following, with e-sports competitions and leagues attracting large television audiences and spectators at dedicated arenas. It has been described by Esports Insider as 'the birthplace of esports'[48] and the inaugural World Cyber Games was hosted in Seoul in 2000. Although now overtaken in size by China and the US, South Korea remains the third largest esports market in the world[49].

The Webtoon Market

In 2022, the South Korean webtoon market attained a value of nearly USD 1.3 billion[50].

Originating in South Korea, webtoons are digital comics usually meant to be read on smartphones. The growth has been driven by the increasing international popularity of manhwa comics – these are similar to the better well-known (at least in the West) Japanese manga, but distinctly different in terms of layout, artistic style and typical subject matter.

The growth over the last twenty years, since the launch of the first manhwa websites, has been dramatic. The dedicated webtoon subscription service Piccoma (which was actually developed by the Japanese subsidiary of the Korean internet company Kakao) is now one of the highest earning non-gaming apps in the world[51].

The global popularity and speedy authoring and delivery of webtoons have opened up opportunities for the exploitation of creative IP and transmedia negotiations, and furthered cartoonists' capacity to reach large digital audiences. For instance, webtoon *Save Me*, used images and characters based around the K-pop sensation BTS, with the webtoon going out in six official languages and generating more than 50 million views over the course of its three-month run[52].

The economic and cultural importance of webtoon production is reflected in the forthcoming opening of the Webtoon Convergence Centre in Bucheon, on the outskirts of Seoul. With considerable funding from the Ministry of Culture, Sports and Tourism (MCST), it will support webtoon cartoonists with training and IP advice, as well as exhibitions and education programmes for citizens.

Immersive media

With its strengths in technological infrastructure and gaming industry, South Korea is emerging as a key player in producing AR/VR experiences and the development of the metaverse.

In 2022 a Global Expert Mission, run as part of Innovate UK's Audience of the Future programme, brought leading UK immersive businesses to South Korea to meet with many of the country's key businesses and researchers. The report[53] from this mission noted the rapid growth of Korea's immersive industries, which underwent an annual growth rate of 33% from 2013 to 2019.

[48] https://esportsinsider.com/2022/05/esports-around-the-world-south-korea

[49] https://www.gizmochina.com/2021/10/19/china-us-south-korea-top-3-esports-market/

[50] https://www.expertmarketresearch.com/reports/south-korea-webtoons-market

[51] https://www.bloomberg.com/news/articles/2022-08-22/popular-manga-app-seeks-2023-ipo-in-tokyo-at-6-billion-value?leadSource=uverify%20wall

[52] https://www.expertmarketresearch.com/reports/south-korea-webtoons-market

[53] https://iuk.ktn-uk.org/wp-content/uploads/2020/12/0477_KTN_GEM_SouthKorea_ImmersiveTechnologiesGTR_final.pdf

It also highlighted the substantial public and industry investment going into the sector. The government is implementing its Immersive Technologies Roadmap, with a total investment of more than £800m to support the advancement of holography, haptics and other technologies associated with virtual reality (VR) and augmented reality (AR) production.

In 2017, the government charged three ministries (Ministry of Science and ICT; Ministry of Trade, Energy and Industry; Ministry of Culture, Sports and Tourism) to jointly work to support R&D, training and the development of new immersive technologies and content by Korean businesses, with a target to achieve a 5% global market share in the sector by 2023[54].

These ambitious government targets are shared by industry. Korea's three major telecoms companies (SK Telecom, Korea Telecom and LG U+) have announced substantial investment strategies for immersive technologies, with reports that LG U+ intend to invest £1.6 billion on immersive content production in forthcoming years[55].

In 2021, the "metaverse alliance" was established to help coordinate and facilitate the development of virtual and augmented reality platforms. Companies and industry groups share metaverse trends and technology, consult on regulatory issues related to the metaverse market and undertake joint R&D projects. It now boasts 600 companies including Samsung, Hyundai Motors, SK Telecom, and Korea Telcom.

5.1.3 Technological infrastructure

The growth of South Korea's digital content sector is underpinned by a telecommunications infrastructure that is often described as being the most advanced in the world.

Twenty years ago, the government implemented regulatory reforms to promote greater competition in along with substantial investment to transform the country's telecommunications network from copper to fibre optic connectivity. As a result, almost universal access to high-speed fixed broadband has been in place for more than a decade.

More recently, South Korea became the first country to launch a nationwide 5G network, with the government setting out an ambitious programme for roll-out and the commercialisation of services. A survey in 2021 found that Seoul had the highest 5G coverage of any city in the world (approximately 93% compared to 44% in London),[56] while as of mid-2022, there were some 25 million 5G subscribers in the country as a whole[57].

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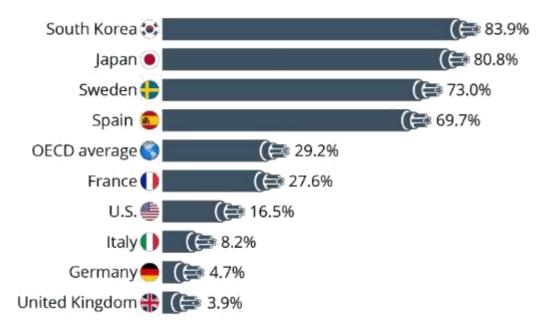
[54] Ibid, p12

[55] Ibid, p11

[56] https://www.fiercewireless.com/5g/south-korea-5g-gets-high-marks-for-both-speed-coverage-rootmetrics

[57] https://www.rcrwireless.com/20220916/carriers/south-korea-ends-july-25-million-5g-subscribers

% of fibre connections in total fixed broadband subscriptions (2020)

Country	%
South Korea	83.9%
Japan	80.8%
Sweden	73.0%
Spain	69.7%
OECD average	29.2%
France	27.6%
U.S.	16.5%
Italy	8.2%
Germany	4.7%
United Kingdom	3.9%

Source: OECD

5.1.4 Challenges

As its creative industries has grown, there has been a corresponding rise in the international profile and interest in contemporary Korean culture.

From the K-Pop phenomenon to Academy-winning films, Korean artists, brands and performers are globally recognised. These cultural strengths, however, belie more longer-term socio-economic concerns, which are themselves reflected in well-known Korean creative works, such as Academy-award winning *Parasite* and the Netflix television hit, *Squid Game*.

South Korea has the world's lowest birth rate,[58] with the continual decline in fertility over the last four decades reaching the point that its population contracted in 2021. It is thought that housing costs and income inequality are factors – the country has the highest gender pay gap of any OECD member[59]. On projections, its population of 52 million in 2020 will be as low as 38 million by 2070[60].

The proportion of Seoul's population over 65 is expected to reach 23% by 2030, and it has been suggested that this may lead to a reduction in its levels of cultural consumption and artistic vitality.[61] Related to this are anxieties around quality of life and a hierarchical and competitive

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[58] https://www.bbc.co.uk/news/world-asia-62670717

[59] https://www.oecd.org/korea/Gender2017-KOR-en.pdf

[60] https://www.koreatimes.co.kr/www/biz/2022/09/602_335593.html

[61] http://www.worldcitiescultureforum.com/cities/seoul

working culture[62] – something from which Korea's media and entertainment industries are far from immune.[63]

In response to this, since the national government has been lowering the maximum number of working hours from 68 to 52 hours per week in 2018. Although disrupted by the Covid pandemic, there is some evidence that this has brought a change in people's perceptions around work-life balance, and increased demand for culture and arts. According to the Seoul Foundation of Arts and Culture, the average leisure time of Seoul citizens increased by 12% from 2018 to 2020. However, following a change of government, plans to raise the maximum weekly working hours to 69 hours are being considered, prompting protests from South Korea's younger generations.

5.1.5 Creative Clusters

The vast majority of national cultural institutions are in Seoul as well as the arts sector and commercial creative industries.

Seoul is a city of ten million people, while the broader Seoul Capital Area is, on the basis of United Nations estimates, the eighth largest metropolitan area in the world[64] and represents some 48% of the national population.

The area of Seoul of particular relevance to digital technologies is Sangam Digital Media City, which has a concentration of media and telecommunications businesses, as well as cultural institutions such as the Korean Film Museum.

It was developed almost twenty years ago in the Sangam-dong district by Seoul Metropolitan Government as part of the wider Millennium City regeneration, with the intention to build an industrial cluster of world-class digital and entertainment companies.

The country's most significant centre for technology industries, however, is Pangyo Techno Valley in Gyeonggi Province, often described as Korea's Silicon Valley. It is here that the research centres of the largest telecommunications, IT and biotech companies are located, as well as large video games studios.

More established cultural neighbourhoods include the Jongno-gu district in central Seoul, which is the centre for visual arts, with large institutions such as the National Museum of Modern and Contemporary Art along with numerous small galleries and more experimental, site-based exhibitions.

The major centre for performing arts is the Daehak-ro district, which is home to a large number of theatres, while the Hongdae area around Hongik University is well known as the premier location for live music and showcasing new musical acts. Outside of Seoul, also in Gyeonggi Province, is Paju Book City – a literary-themed town overseen by the MCST with more than two hundred publishers, printers and bookshops.

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[62] https://www.oecd.org/employment/jobs-strategy/implementation/implementation-highlights-korea-working-time-2020.pdf

[63] https://www.theguardian.com/global/2020/mar/29/behind-k-pops-perfect-smiles-and-dance-routines-are-tales-of-sexism-and-abuse

[64] https://en.wikipedia.org/wiki/List_of_largest_cities

5.2 South Korea's policy and investment environment

5.2.1 National Policy

Since the 1990s, the national government has actively promoted South Korea's creative industries and from the early stages this has had an emphasis on the intersection between creativity and technology.

In the late-90s, a dedicated cultural industry department was set up within the Ministry of Culture and Tourism (enlarged in 2008 to become the Ministry of Culture, Sports and Tourism, MCST), recognising that the sector was becoming increasingly economic important. In 1999, the Cultural Industry Promotion Framework Act established the Developing Fund for Arts and Culture, with a minimum of 1% of government budget allocated to culture every year.

The government also introduced the 'arm's length' principle into its support for culture, reorganizing the **Korea Film Council** in 1999 and in 2008 establishing the **Korea Communications Commission** to ensure more transparent and effective investment in Korea's culture and creative industries. In 2006, the **Korea Arts Management Service (KAMS)** was founded, providing support services, especially with regards to promotion and international exchange, for the performing and visual arts.

Since the creative industries have become a national policy priority, areas of particular focus have been video games and animation, and film, broadcasting and music. As their economic significance continued to grow, the MCST in 2009 established the **Korea Creative Content Agency (KOCCA),** a strategic governmental agency that coordinates the promotion of Korean creative content especially for smaller businesses working in films, games and animation.

In broader terms, the considerable investment in digital technologies and creative content production can be considered as elements of a long-term national strategy to transition into a 'creative economy', with high level of public and private investment at national and capital city level.

The public investment and is mirrored in the growth of Korea's best-known company Samsung which, upon entering the electronics industry in the late 1960s, has grown to be one of the world's leading multinationals. Well known for semi-conductor production, pioneering LCD technologies and for vying with Apple as the world's largest mobile phone maker, the company also has extensive interests in media and the creative industries – this includes Cheil, the country's largest advertising agency, and now one of the top twenty in the world on revenue earnings.

In 2020, the Korean government launched its **Digital New Deal**, a strategy for promoting the creative and digital industries. It focuses mainly on structural reform of the sector to enhance its global competitiveness. According to the strategy, the government plans to expand infrastructure for generating online content, un-tact performances, and next-generation content using AI, VR, and AR technologies.

It also aims to improve the regulations and policies for copyright and other intellectual property. After the international success of Korean creative content, the Ministry of Culture, Sports and Tourism is keen to ensure that Korean producers are better able to generate and retain their

own IP, rather than, as was the case with the hit *Squid Game* television series, much of the profit to be made by international distributors such as Netflix.

5.2.2 Seoul Metropolitan Government

Given its size and economic importance, the Seoul Metropolitan Government (SMG) plays an important role in shaping the country's cultural policy.

In February 2022, the SMG announced its **Digital Culture City** plan, with an accompanying programme of £50million.

The plan states that 'by applying digital technology, every citizen of Seoul can easily approach arts and culture without barriers, and creators can present their works to citizens' and it puts forward a number of initiatives directly relevant to arts and technology, including funding so that the city's principal museums and galleries can be 'smart', with digitised collections, facilities and spaces.

There will also be city showcasing activities and festivals, including the new **Seoul International Media Art Festival,** and continued support for the **Seoul Light Festival**. This was launched in 2019 by SMG and the Seoul Design Foundation and has rapidly grown in popularity, with giant video screens and images and artworks projected onto the façades of iconic buildings, notably the exterior surface of the landmark **Dongdaemun Design Plaza**.

More broadly, the Digital Cultural City plan aims to embed digital arts into the landscape of the city, with permanent exhibition spaces and large-scale screens, in which creative work can be displayed. Such public art projects will be integrated into the Nodeul Island, Seonyoudo Park, and Nanji Hangang parks associated with the Han River, as well as the Seoul's historic quarters and monuments.

Deep dive: Seoul Smart Museum Initiative

A part of Seoul Metropolitan Government's Digital Culture City Plan announced in February 2022, the city is planning a major programme to digitally enhance the museums operated by the SMG to improve accessibility and experience for its citizens.

This initiative seeks to incorporate advanced technologies into the visitor experience for the city's museums – even those which do not have a contemporary or technology focus.

While visual arts museums and galleries have typically been closely associated with technologically enhanced experiences, this is not the case for cultural heritage museums. This can be due to a range of reasons, from the upfront costs involved in acquiring the necessary hardware, to a lack of technological competency within the institution.

The Seoul Smart Museum Initiative aims to position the city's museums sector as a global leader when it comes to digital transformation.

The rollout of the scheme could offer valuable insight for UK museums and policymakers interested in the application of AR, CR and advanced projection technologies to enhance the visitor experience.

It may also provide opportunities for UK museums and creative businesses that have acknowledged expertise and experience in technology and exhibition design.

The table below summarises the museums and the kinds of projects that are currently under development or being planned:

Seoul Museum of Craft Art	**VR-based Online Museum** The Seoul Museum of Craft Art has built a three-dimensional virtual exhibition space to provide a 360° VR experience exhibition service that feels like actually visiting a museum. Citizens can see it on the museum's website or mobile.
Seoul Hanseong Baekje Museum	**GPS-based Augmented Reality Game Application** Using GPS-based augmented reality technology, the museum will develop an AR digital smart game app that allows visitors to explore Mongchontoseong, an ancient earthen fortress and national monument
Seoul Museum of History	**Using Projection Mapping and VR Interactive technology for exhibitions** The Seoul Museum of History is creating a panoramic exhibition that makes use of projection mapping, projecting images onto various types of objects in the museum's urban model exhibition hall. It will reproduce Jongno, one of the city's oldest thoroughfares in "The Street of Enlightenment", a permanent exhibition making use of VR technology.

Seoul Museum of Korean Folk Music	**Diorama, AR technology for workshop programmes in 3D environment** Seoul Museum of Korean Folk Music plans to run a programme at the end of the year where citizens can enjoy traditional folk songs and sounds in a 3D environment using diorama and AR technology.
Seoul Museum of Art	**3D digital content exhibition** Seoul Museum of Art will digitally exhibit much of its collection, including works by the sculptor Kwon Jin-kyu, using 3D technology developed by the city museums.
Pungnap Fortress	**Digital Experience Hall (2026)** SMG will continue to undertake archaeological studies the historic fortress in Pungnap-dong and excavate key areas such as the royal palace site of Hanseong-do-eup in Baekje. As part of this, a digital experience centre will be created in 2026 so that all citizens can experience and understand the excavation works.

Image credit: Mongchon History Museum

5.2.3 Public funding and investment

South Korea's principal arts funding bodies all have some kinds of focus on the use of technology within the arts, with funds going towards artistic creation and exhibition.

The largest is **Arts Council Korea**, which has been providing dedicated funding for arts and technology projects since 2012.

Its flagship arts technology programme is the '**Arts and Technology Convergence Support'** scheme which has been running annually for some years. The total budget allocated for the 2023 programme is in the region of £80million, with the funds to be spent under the three broad headings of 'plan', 'creation' and 'diffusion'[65].

This therefore includes funds for the 'creation, production and presentation of technological convergence art works' as well as activities intended to encourage the dissemination of such art works through public engagement and exchange projects. The Korea Arts Management Service (KAMS) provides services that complements this. Rather than direct grant funding, it aims to support arts start-ups, practitioners and new cultural organisations through training and mentorship.

The **Seoul Foundation for Arts and Culture** has been a long-standing funder of arts technology through its Da Vinci Creative scheme which ran from 2010-19, providing funding over the decade to almost a hundred productions, many of which were showcased at its biannual festival. As described below, this has evolved into the **Unfold X festival,** which still provides funding for a small number of new art commissions, but is intended to be more of a programme for showcasing and exchange.

There is a strong culture of supporting entrepreneurs and small businesses in Korea, with a dedicated Ministry of SMEs and Start-Ups and well-resourced programmes providing incubation, R&D funding and international promotion for young science and digital technology businesses.

Schemes such as the **K-Start Up Grand Challenge** or the **Tech Incubation Programme for Start-ups (TIPS)** are well established and attract matched private and venture capital investment for participants. The Korean government has recently announced a similar programme for the creative industries, to be managed by KOCCA with 200 creative content start-ups each to receive approximately £100,000 in funding, business support and mentoring[66].

5.2.4 South Korea – UK exchange

Given the size of the South Korean creative industries market and its advanced technological infrastructure, there has been considerable interest in developing connections from UK government and industry.

For instance, in 2019, the DCMS and the South Korean government ran a £2.4m competition to support UK businesses to develop and test services and AR experiences for the 5G network running on the Seoul subway system.

In 2016 a memorandum of understanding between Arts Council Korea and Arts Council England, was signed, with support of the British Council, which recognised "the importance of

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[65] Not available in English, but detailed here: https://www.arko.or.kr/board/view/4013?bid=463&page=3&cid=1805514&sf_icon_category=cw00000019
[66] https://koreajoongangdaily.joins.com/2023/02/22/entertainment/television/Korea-culture-ministry/20230222184658208.html

culture as an instrument for integration, the development of society and the existing fruitful cultural cooperation between South Korea and England."

Following on from this, the British Council's UK/Korea 2017–18 Creative Futures programme saw more than 180 cultural events and activities across South Korea.

More recently, under the auspices of the Audience of the Future (a programme of R&D investment in immersive media, as part of the British government's Industrial Strategy Challenge Fund), a Global Expert Mission (GEM) to South Korea took place in 2022. This mission brought a number of immersive businesses and researchers to Korea in the hope of initiating potential commercial and R&D partnerships. Another GEM, with a focus on telecommunications, came to Korea in March 2023.

5.3 South Korea's arts and technology ecosystem

As noted, the creative industries, arts and digital technologies have been a priority for policy makers at the national and city level.

This has accompanied the growth of major electronics and telecommunications businesses, sustained private and public investment and extensive R&D capacity. As a result, there is a rich arts and technology ecosystem in South Korea, which is summarised below.

5.3.1 Venues and exhibition infrastructure

In addition to efforts to increase the technological capacity of existing cultural institutions, South Korea has a number of galleries and venues with a particular focus on arts and technology, with a track record of programming and commissioning.

As referenced above, as part of Seoul's Digital Culture City strategy the 'Smart Museum and Galleries' initiative will aim to digitise many of Seoul's cultural institutions.

This will include the museums of craft, history, folk music and art, which will have facilities and exhibition spaces needed for AR/VR experiences, interactive environments and the projection of 3D digital content.

These are national museums with dedicated collections rather than centres actively commissioning new artistic work – however, they can be expected to provide new opportunities for curators and producers to make creative use of digital technologies.

- Opening in 2000, **Art Centre Nabi** was the first gallery dedicated to arts technology, and for the last twenty years it has been curating programmes, hosting exchanges and commissioning creative works at the intersection of arts, technology and the social sciences. Nabi Edu is a nine-month training and mentorship programme that promotes collaboration between artists, scientists and industry, covering idealisation, prototype production, finance and commercialisation.

- The **Namsan Creative Centre**, which is a theatre and venue for large musical works has been remodelled by the SMG so that it can develop productions using the latest

technologies. Closed since 2020 due to the work, on reopening facilities will include XR and special effects studios, recording and editing suites and hologram projection.

- The new **Robot and Artificial Intelligence Museum** will shortly be opening in Seoul showcasing AI, robotics and related scientific innovations. The building is intended to be highly futuristic in its design, with the structure itself partly assembled and maintained by robots.

5.3.2 Centres for creative R&D

The development of arts tech has gone hand in hand with research and development, and countries with advanced arts tech sectors have a highly developed research base.

However, R&D in the creative industries is quite different from sectors such as pharmaceuticals or electronics, with its own distinct innovation processes that are often embedded in a creative production itself.

As is the case in the UK, therefore, there is a range of institutions driving innovation, new technologies and approaches to arts tech – universities and corporate research facilities, but also cultural institutions and exhibition centres, of the kind noted above.

Depending on the nature of the organisation, the degree of openness and opportunities for international exchange and collaboration will vary.

The following are some of the most active R&D arts tech centres, which gives a sense of this range:

- **Korea National University of Arts (K-Arts), Art Collider Lab**: undertakes research at the intersection of art, technology and society particularly in terms of developing art education programmes. It works closely with national arts institutions and   also international exchange and research projects.

- **ATLab (Art and Technology Lab)**. Also affiliated to K-Arts, but is more of a production lab that aims to bring together science, technology, arts and culture, industry, and education. It collaborates with universities, tech companies, and international researchers.

- **Hyundai Zero One**. The car manufacturer has established an open platform for artists, engineers, and entrepreneurs. It invests and helps to grow not only tech startups but also artists and other types of organisations. In recent years, it has hosted and taken part in international collaborations on such subjects as mobility smart cities, renewable energy, and robotics.

- **Gwangju Institute of Science and Technology**. Founded in 2013, this is a government-research institution in arts technology innovation and policy development. Research priorities includes AR/VR production tools, artificial intelligence and user experience design.

5.3.4 Festivals and international exchange opportunities

There is no equivalent to the British Council in Korea that is shaping international cultural policy or co-ordinating cultural exchange initiatives.

However, there are a number of different events and platforms for showcasing arts tech installations and projects, and these are generally doing some kind of international exchange, even at a basic level – for instance, inviting keynote speakers and curators, or presenting international artworks.

Similarly, Korean arts and technology projects often have a presence at festivals and events around the world.

In 2020 the Seoul Foundation for Arts and Culture launched **Unfold X**, the 'Seoul arts and tech festival', aiming to showcase Korean arts and technology works, as well as serve as a platform for international collaborations.

This is the successor to SFAC's Da Vinci Creative programme, but it is envisaged that Unfold X will cover a broader range of artistic forms than Da Vinci Creative and that it will be less of a funding scheme, and more of a platform that encourages collaboration with international partners.

In 2022 the festival supported artist and curatorship exchanges with Germany's Centre for Art and Media Karlsruhe and the House of Electronic Arts in Switzerland.

Many of Korea's major arts and technology institutions are involved with Unfold X including the **Paradise Culture Foundation**, **KOCCA R&D Center**, **Gwangju Media Art Platform**, and **Universal Robots.**

In addition to Unfold X, there are a number of other festivals and showcasing activities in which arts tech is an increasingly important feature:

- The Korea Arts Management Service will be launching the **Arts Korea Lab in 2023**, an international forum running in conjunction with an open funding call, based around arts technology (see deep dive case study).

- The **Seoul Performing Arts Festival**, hosted by KAMS every October, is collaborating with the Goethe Institute on its Urban Walk project, which features an open call for artists working on the relationship between urban culture and technology.

As well as hosting and exhibiting artists in Korea, there are a number of Korean-based artists working in the field who have developed international links and showcase their works at festivals, especially Ars Electronica in Austria.

For the last two years, a collaboration between Ars Electronica and K-Arts University's Art Collider Lab has presented the works of the Lab's graduates, while Arts Council Korea has provided funding for Korean producers to participate at the festival. Ars Electronica and Hyundai Zero-one have also jointly held an international workshop on the 'Smart City' theme.

Deep dive: Art Korea Lab

Art Korea Lab is a new studio space overseen by Korea Arts Management Service (KAMS), which is scheduled to open in October 2023.

A five-floor building, its facilities will include demonstration equipment and exhibition spaces, lecture and media rooms and offices.

It is intended to function as an incubator offering comprehensive support across a range of different activities and also types of arts organization. This covers creation and production; exchange and education; demonstration and distribution; start-up and enterprise support.

Ahead of its opening in October, Art Korea Lab has selected 25 companies, or teams, as its first residents. These are divided into two groups: creative and technology based.

The former includes such artistic disciplines as visual arts, performance and sound production, while the latter covers companies working in fields such big data, VR/AR and blockchain.

Each company will be able to reside for up to three years at the Art Korea Lab studios and offices and have the opportunity to apply for funding support.

Art Korea Lab aims to be a 'driver of future growth of art activities and business' and a place for experimentation and the production of new art, as well as commercialization. It seeks to provide a solid foundation for artists to use new tools to expand their creative reach.

In this context, collaboration with overseas partners will be actively promoted, with an envisaged international programme of creative workshops, education, and the exhibition of artworks.

This will include a partnership with Seoul Performing Arts Festival on the theme of art and technology for the next three years, which new works produced shown both in Korea and abroad.

As part of Art Korea Lab's international plans there is strong interest in the UK, where organisations such as NESTA have informed the development of R&D policy.

KAMS have expressed eagerness to collaborate on creative workshops, lectures and other activities with UK partners and artists as part of the lab, for example over the course of the opening events of Arts Korea Lab which will take place in October 2023.

5.4 Creative producers

Arts and technology projects are often complex and highly collaborative, requiring multi-disciplinary teams and people with skills and expertise in different art forms and technical subject areas. As such, South Korea's producers often play a big role in the creative process, bringing together the artists, scientists, audio-visual engineers, designers and researchers needed to realise a project.

Creative producers can be based within particular institutions or venues such as those mentioned above or will function as independent production companies, working with different venues and partners on a project-by-project basis.

In general, it is in the field of visual arts, which is less physically constrained than other art forms, in which new technologies such as AR/VR are most being used, in the same way that video and digital graphics were adopted as tools by visual artists twenty years ago.

However, the performing arts sector is also making use of such technologies in order to enhance the stage environment and provide audiences with new experiences.

- **Tacit Group**: Founded in 2008, the artists in Tacit Group are inspired by digital technology and produce multimedia performances, interactive installations and are active across music, fine art and performing arts. The group built an international reputation after being invited to Aarhus Festuge (Denmark) in 2011 for the opening performance.

- **D'strict** is a leading Korean immersive design company. The company is particularly well known for its large-scale immersive installation Arte Museum, which took place in a renovated factory building in Seoul in 2022. The space was 4600 m2, with 10m high walls displaying creative works from ten different artists.

- **Kimchi and Chips** is an artistic partnership founded in Seoul in 2009 by Korean and British artists Mimi Son and Elliot Woods. Their work explores the intersection of art and science and philosophy through ambitious large-scale installations that have featured at major festivals and venues across the world.

- **GiiÖii Immersive Studio** is an immersive content and story-based multiverse production studio, founded by the producer, Hyewon Lee, who is well known for her interactive entertainment work both in Korea and in the US (see deep dive case study).

- **Bang & Lee,** a media artist collective who produce large-scale media art installations, research-based experiments, site-specific social plays and commissions for heritage sites. The duo worked with the Watershed in Bristol and Art Center Nabi as part of a creative commission by the British Council and the Korea Foundation *Gathering Moss,* which jointly develop a "digital landscape populated with artistic ideas made in response to the climate emergency."

Deep dive: GiiÖii Studio

GiiÖii is an immersive storytelling studio that originates, produces and distributes storytelling-based XR content globally. It was founded and still run by Hyewon Lee, who is well known in the industry and worked as an interactive entertainment producer in the US for many years.

The studio runs an online magazine called IXI (ixi.media), which serves as a gateway for Korea's XR industry and content to international markets.

GiiÖii Studio prioritizes storytelling and uses technology to enhance it in the most effective way possible. Its goal is to immerse audiences in the content regardless of genre or theme and works with artists from various art and entertainment forms, including films, documentaries, dance, and theatrical musicals.

As contemporary audiences are increasingly made up of digital natives, the studio is focusing on more user-based 'story-worlding', which allows audiences themselves to shape the story development.

Since its inception, the studio has been aiming for global markets and audiences, recognizing that technology-based content can more easily overcome regional boundaries. As the domestic Korean XR market is still relatively small, the studio focuses on producing works for international audiences, initiating transnational co-productions and distribution agreements through its own networks as well as its presence at industry events such as Cannes XR.

Image credit: GiiÖii Studio

In the past two to three years, the studio's works have been well-received in overseas markets, including "Missing Pictures", produced in collaboration with the leading French XR studio Atlas V, a documentary series that presents incomplete works of renowned directors in VR form.

Additionally, the studio's original work "Carving with Memories: Ihyangjeong" was invited to the 2020 IDFA in the Netherlands and the 2021 DOK Leipzig. The studio receives many such proposals for international collaboration.

In regards to the UK art and tech field, the studio has had initial meetings with the National Theatre and Barbican around potential projects, and studio is open to such exchange and collaboration, as a mediator and producer of large-scale works or festivals.

It is currently planning to support the presentation of works by the UK artists Marshmallow Laser Feast, as it has particular experience and expertise in site-based productions.

6. Future opportunities for cultural exchange

As this report has demonstrated, there is considerable interest and awareness of the UK arts and technology scene, and an eagerness in Hong Kong, Japan and South Korea to pursue further opportunities with UK-based organisations and practitioners. This includes individual artists, businesses, cultural institutions and research centres.

The British Council is well recognised as being a vehicle for facilitating these connections, and further developing those relationships that are in place.

Moreover, arts and technology is increasingly prioritised in policy and investment in all three countries and territories, leading to the development of new collaboration initiatives, infrastructure and R&D projects.

This research has identified particular future opportunities, often arising directly from interviews and consultation with key contacts.

Some of these are immediate and tangible, for instance in relation to forthcoming events and festivals, while others have the potential to be more strategic and long-term in their nature. They are summarised in the following sections.

Hong Kong

- **East Kowloon Cultural Centre**: construction of this major cultural hub and performing arts venue is near completion, with its opening scheduled in phases across 2023 and 2024. The EKCC is expected to play a significant role in the development of Hong Kong's Arts Tech sector, especially in relation to performing arts, with opportunities for UK-based artists and performers through exchange and residency programmes the venue will run.

- It is notable that many Hong Kong arts and technology practitioners are **alumni of UK universities** (e.g. Phoebe Hui, Ng Tsz Kwan) and Hong Kong-based digital media studios with **international offices** will tend to locate in London (e.g. Metaobjects, Gusto Collective). These academic and business connections are a good basis for further cultural exchange.

- In response to government policy directives, arts and technology is becoming a more prominent programming strand within Hong Kong's existing festival and cultural events, such as the **International Arts Carnival**, **New Vision Arts Festival** and the **Hong Kong Arts Festival**. These will provide increasing opportunities for leading UK arts and technology practitioners and researchers to participate and showcase their work.

- The Culture, Sports and Tourism Bureau's (CSTB) **Arts Technology Funding Pilot Scheme** is specifically aimed at supporting Hong Kong's major performing arts companies to incorporate new technologies into their productions and stagecraft. This may lead to future opportunities for UK performing arts organisations which have undergone similar journeys, such as the Royal Shakespeare Company, to collaborate across Hong Kong's performing arts sector.

Japan

- In 2025, Osaka will be hosting the **World Expo**, on the theme 'Designing Future Society for Our Lives'. There will be eight themed pavilions showcasing Japanese creativity and innovation, programmed by some of the country's leading media artists and technologists. The Expo will be a key opportunity for a delegation of UK artists, technologists and thought leaders to expand their networks and find new collaborations.

- The JST funded **xDiversity** programme funds research into technologies which widen access to arts and entertainment for people with disabilities. This provides opportunities for collaboration and knowledge-exchange with the UK's disability-led cultural organisations and creative businesses, as well as for broader policy exchange aiming to make sure arts and culture is accessible to all.

- The UK's rich and growing network of arts and technology centres are well-equipped to host **pioneering Japanese musicians and sound artists** who are pioneering new modes of performance using advanced audiovisual and AI technologies.

- In recent years there has been a number of **UK-Japan initiatives** related to arts and technology (UKRI expert missions, UK-Japan Digital Partnership, Japan / UK Season of Culture 2022). These have provided a good basis for further collaborations and partnership.

- Japan's **dynamic network of interdisciplinary R&D labs** hold significant potential for professional exchange and development, whether that is through artistic or research residencies, study visits, or collaborative research projects with UK cultural and academic partners.

South Korea

- **Art Korea Lab** will be a major new arts tech venue and studio space. There is an eagerness to collaborate on creative workshops, lectures and other activities with UK partners and artists. In particular, as part of its opening celebrations in October, it would welcome the participation of UK artists or creative professionals who are able to share insights on the UK arts technology scene.

- The substantial investment associated with the **Seoul Smart Museum** Initiative to digitally enhance its exhibitions and collections provides good opportunities for mutual exchange and collaboration with the UK, in which there is acknowledged expertise.

- The Seoul Foundation for Arts and Culture is running the newly established **Unfold X festiva**l, which showcases Korean arts and technology, and provides a platform for international work. The festival already has a number of European partners and would welcome collaboration with UK artists and organisations..

Events and festivals outlined above are not the only opportunities for cultural professionals from the UK and Northeast Asia to convene. Other key international gatherings such as **Mutek**, **Ars Electronica** festival and **SXSW** are also important moments in the arts and technology sector calendar. **SXSW Sydney** in particular has potential to open connections to Asia.

Looking at inbound opportunities, in addition to the year-round programming of the arts and technology centres listed in the introduction to this report, there are also inbound conference

and festival opportunities for artists and professionals based overseas – albeit there are currently no events of the scale of Ars Electronica etc that take place in the UK. These events include BFI's London Film Festival, **LFF Expanded**; **Beyond Conference** run by UKRI's creative economy team, and **Now Play This**, a festival of experimental games design.

In addition to the opportunities for co-productions, residencies, delegations, showcasing and networking highlighted above, it is worth highlighting the interest and opportunity that exists on the UK side. In particular, the Global Expert Mission programme, which is run by the Knowledge Transfer Network under the auspices of UKRI, has already run a number of missions of direct relevance to this project – including immersive media visits to Japan and South Korea that took place last year.

These were associated with (and partly funded through) the considerable investment that has gone into VA/AR technologies and immersive experiences through Innovate UK's Audience of the Future R&D funding programme.

While such missions have had more of a technology focus, with the emphasis on R&D knowledge exchange and commercial research partnerships in the field of telecommunications, there is a growing recognition of the strength of the creative industries in these countries.

In particular, there is interest within the KTN to work with the British Council on future activities, including missions, that can reflect both the artistic and technological strengths of the UK and East Asia, and which can have a broader cultural remit, with opportunities for exhibition and presentation as well as research and trade.

Appendix A: Directory

This research uncovered individual artists, researchers and creative studios that were identified as being especially active and influential in different fields of and arts technology.

The table below captures many of these and provides a summary of their focus and illustrative work, for easy reference. It does not represent an exhaustive list of arts and technology practitioners in the three countries and territories.

Hong Kong

Name	Individual / Organisational base	Main focus of artistic practice and technology
Alan Kwan	Visual artist and video games designer	Awarded at Ars Electronica for his experimental videogame Scent
Alexon Chu, Henry Lam and John Wong	Arts collective XRT	Art installations depicting the Hong Kong cityscape using immersive technologies
Carla Chan	Visual artist	Creates NFTs from real time meteorological data
Chaklam Ng	Sonic artist	Developed device that translates human dialogues into rhythm and tone
Chilai Howard	Interdisciplinary artist and designer	Experimental mixed media installations have been exhibited at Tate Modern
Choi Sai Ho	Sonic artist and composer	Participated in Solar Calling project, with compositions transmitted into space
Chris Cheung	Visual artist and founder of XCEPT creative studio	Installations using generative and big data to visualize environmental crisis

Echo Hui	Multidisciplinary artists	Uses experience of congenital anosmia to explore human senses through robotics and mechanics
Ellen Pau	Visual artist, founder of Microwave New Media festival	Digitally animated special effects that address political and social issues
Gaybird	Electronic music composer and artist	Works at intersection of engineering, electronic music, robotics and visual effects.
Gusto Collective	A 'brandtech' creative agency based in HK with offices in London and Shanghai	Created 'metahuman' artist MonoC, a virtual human who produces generative art from data
Kachi Chan	Visual artist, based in Hong Kong and London	Robotic art installations
Keith Lam	New media artist, curator and founder of creative studio Dimension Plus	Installations that incorporate machine learning, 3D printing, sensors and robotics
Metaobjects	Digital production studio based in Hong Kong and London	Generative artworks and motion-tracking systems for installations
Ng Tsz Kwan	Interactive media designer, founder of studio N.T. Lab	Design and media work across art, advertising and exhibition sectors
Phoebe Hui	Multimedia artist and academic at Hong Kong Design Institute	Visual arts making use of scientific imagery and illustrations produced by robot
Samson Young	Internationally-recognised multimedia artist and founder of artistic collective Contemporary Musiking Hong Kong	Sound, performance, video and computer-generated music installations
Victor Wong	Founder of computer graphics company vfxNova	Well known for AI Gemini, a robotic arm

Name	Individual / Organisational base	Main focus of artistic practice and technology
		that paints Chinese landscapes with ink and soft brushes
Vvzela Kook	New media and performance artist who whose work is exhibited internationally	Combines technology with performance, theatre, generative video and drawing
Zuni Icosahedron	Experimental theatre group based at the Hong Kong Cultural Centre	Have established the Z Innovation Lab to explore technological innovations in theatre
IOIO Creative	Transmedia studio	Facial recognition, projection and interactive games in a theatre setting

Japan

Name	Individual / Organisational base	Main focus of artistic practice and technology
Ai Hasegawa	Bioartist	Uses DNA and computer simulators to address issues around culture, ethics biotechnology
Alter, an android robot that has conducted live performances	A collaboration between Ishiguro Lab at Osaka University, and Takashi Ikegami Lab at the University of Tokyo	Has conduced the 'android opera' Scary Beauty, in major arts venues in Japan and also internationally, including the Barbican Centre
Dentsu Craft Tokyo	Creative agency	Collaborates with artists on digital and virtual production projects
ELEVENPLAY	Performing arts group	Known for incorporation of advanced technologies in their performances

Etsuko Yakushimaru	Artist and pop star	Converted pop song 'I'm Humanity' into DNA
Hideo Iwasaki	Professor at Waseda University and founder of metaPhorest, a 'bioaesthetics' platform	Collaborates with artists and biologists on the aesthetics of biological phenomena
Nomena	Creative design studio	Work at the intersection of architecture, urbanism and arts and technology. Projects include the design of Tokyo's Olympic cauldron
Qosmo	An 'AI creativity and music lab' which develops AI tools for artists and companies	Produce live DJ performances using AI-generated audio and images
Reo Anzai and Santa Naruse	Artists and members of the Computational Creativity Lab at Keio University	Audio-visual performances combining human and AI artists and composers
Rhizomatiks	Visual and performance arts collective	Produce large-scale immersive artworks and performances
Ryoji Ikeda	Visual and sonic artist	Creates immersive performances and installations, including at London's 180 Strand
TeamLab	Interdisciplinary artist collective	Exhibit immersive installations at venues across the world
Tomo Kihara	Artist and game developer	Designs games and urban interventions that explore socio-cultural issues through play
Yasunao Tone	Multi-disciplinary artist who has been working since the 1960s	Has collaborated with the University of Surrey to simulate virtual versions of Tone in liver performances

| Yosuke Takahashi | Curator | Carved out niche in bioarts curation |

South Korea

Name	Individual / Organisational base	Main focus of artistic practice and technology
Bang & Lee	Seoul-based arts duo	Site specific Installations incorporating elements such as interactive technology, kinetic light, sensor-based musical instruments
Bora Kim	Choreographer, working with motion capture techniques	Worked with Korea National Contemporary Dance Company and SPAF on its VR project, Simultaneous Sense
D'strict	Leading Korean immersive design company	Works with artists to produce large-scale immersive installations
GiiÖii Studio	Immersive content studio founded by Lee Hye-won	Produce multiverse entertainment and XR content
Kimchi and Chips	Artistic partnership founded by Korean and British artists Mimi Son and Elliot Wood	Work at the intersection of art and science through installations at venues and festivals
Lee Jeong-yeon	Artistic director of the Lee Jeong-yeon Dance Project and a professor at Yongin University's College of Culture and Arts	Uses AR to produce immersive dance productions
The Strangers	Performing art group	Produced "Tamara", a location-based theatre-game that has been

		performed at festivals in UK
Tacit Group	The artists in Tacit Group are inspired by digital technology and are active across music, visual and performing arts	Produce multimedia performances and interactive installations at venues and festivals
Vomlab	Interactive media studio	Use projection mapping technologies as part of performing arts shows
Zero1ne	Collaborative platform for digital artists and technologists	Brings together a network of individuals on creative projects

Appendix B: Consultees

With thanks to the following individuals, who were consulted as part of this research:

Name	Organisation / Role	Country / Territory
Desmond Hui	Department Head of the Department of Art and Design of the Hang Seng University of Hong Kong	Hong Kong
Kingsley Ng	Multimedia artist and Head of the Bachelor of Arts and Science (Hons) in Arts Tech, Hong Kong Baptist University	Hong Kong
Rebecca Yu	East Kowloon Cultural Centre and Planning Section at Leisure and Cultural Services Department	Hong Kong
Victor Wong	AI artists and owner of vfxNova studio	Hong Kong
Chiaki Soma	Cultural producer, Theatre Commons Tokyo	Japan
Hirokuni Miyamatsu	Formerly at Panasonic and the British Consulate General in Osaka as an industrial advisor.	Japan
Junya Yamamine	Curator, CEO, NYAW inc. and Co-president of Tokyo Art Acceleration	Japan
Yasuyuki Kakehi	Professor, The University of Tokyo	Japan
Chad Kunimoto	Global Business Development Manager, Panasonic Connect	Japan
Hye-won Lee	Founder, Giioii Immersive Studio	South Korea
A-reum Kim	Seoul Foundation for Arts and Culture, <Unfold X>	South Korea
Kyu Choi	Seoul Performing Arts Festival	South Korea
Youn-kyoung Lee	Korea Arts Management Service	South Korea
Matt Sansam	Innovate UK	UK
Jonathan Kingsbury	Director, Knowledge Transfer Network, Innovate UK	UK

Appendix C: Clarification

We regret that an earlier version of this report contained inaccuracies and factual errors in the Deep Dive section on the East Kowloon Cultural Centre (EKCC) in Hong Kong, which have been amended in this updated version.