Playing with Videogame Culture:

Working with games to engage the public in climate action

Prepared for UKRI
Iain Dodgeon & Iain Simons

UK Research and Innovation

OKRE

Contents

Executive Summary

Ahead of the COP26 conference in Glasgow later this year, UKRI commissioned OKRE to research and scope the potential for videogames to be the anchor of a national public engagement initiative focused on climate change.

The Covid-19 pandemic has triggered enormous change, with our lives increasingly moving into online and digital spaces. Ever more organisations seek to provide content and engage audiences in these spaces, harnessing varied ways of interacting across different media and platforms including social media, streaming content, podcasts and videogames.

UKRI is committed to exploring creative and innovative ways of engaging with the public, reaching more diverse communities, particularly those currently underrepresented in their engagement with research and innovation.

UKRI commissioned OKRE to explore the opportunities afforded by videogames for engaging the public with issues around climate change with the objective of offering hope and supporting positive action.

We conducted a review of past and present projects in games and climate, based on desk research, and consulted with professionals across the video games, research, heritage and local charity sector.

This report collates and synthesises that work.

Videogames and Culture

The evolution and growth of digital technologies has seen videogames play an ever greater role as a global cultural force. They are now recognised as the most important aspect of youth culture.

Their value, both culturally and economically, came into sharp relief during the pandemic in 2020, with sales in the UK rising by 29% on the previous year to £7bn with 62% of all UK adults playing videogames during the period.

People no longer just play videogames; they also play with videogames. Alongside streaming of gameplay, live performance, content creation, modding and cosplay, games have become social destinations in their own right - including to access other cultural experiences such as music concerts and film screenings.

This presents a significant and mostly untapped opportunity for public engagement. To date most engagement activities have focused on gamification. However, the number of videogames now available for young people to choose from has risen vastly over the last decade. As a result, investing in the creation of a single videogame as an engagement strategy can be both expensive and high risk - with any output competing with industry giants such as *Fortnite*.

Videogames and Climate Change

Historically mainstream video games have had limited engagement with climate change, appearing occasionally as a thematic challenge within the genre of simulation games. *SimCity, SimEarth* and more recently the *Civilization* series have featured rising sea-levels,

pollution and global warming amongst the problems for the player to control and manage, albeit at a broad municipal or global level.

Since the wider availability of accessible game creation tools, smaller studios have begun to produce more personal, political work. As a result more environmentally engaged games have begun to appear. These games are often more explicitly marketed as being about the climate or having an environmental message.

Alongside these individual products, the videogame industry as a whole is beginning to acknowledge and address its own long-term sustainability. The *Playing for the Planet* Alliance facilitated by the UN Environment Programme brings together pan-industry pledges to reduce carbon and drive corporate responsibility. It includes a Green Game Jam initiative, which invites studios to implement 'green activations' in their work, adding new levels themed around global challenges restoring forests and oceans.

Whilst these developments are a positive shift for the industry, there is the inevitable challenge that such overt climate-themed games and initiatives struggle to appeal to those who are either not interested or disengaged from climate and sustainability issues. It is the potential for games to appeal to this broader audience that is of particular interest to the Public Engagement sector.

Games and Engagement with Underrepresented Audiences

UKRI's Vision for Public Engagement includes a commitment to improve the opportunities to participate in activities related to research and innovation for communities currently underrepresented in existing work. With that in mind, there is interest to understand what games could uniquely offer to support this goal.

From the data currently available it is unsurprising to see that game genre and platform influence player demographics. Audiences build also around games, characters and stories more reflective of and relevant to their particular communities and interests.

This suggests the potential is certainly there for games to engage those traditionally underrepresented in existing engagement work. However, as with all engagement activities, to stand the greatest chance of success those experiences should be designed with the specific audience in mind from the start and an understanding of the community embedded in the creative team and process.

This applies also to mitigating the impacts of digital exclusion. Access to equipment, skill and interest are among the potential barriers to participation. Ensuring non-digital alternatives are not just available but core to engagement initiatives around games (rather than a peripheral add-on) is crucial to avoid widening the gap of opportunities available to different communities.

Innovations in Engagement

Given this background, there was interest in exploring an approach that could appeal to diverse communities regardless of digital access and existing engagement with environmental issues. UKRI have keen interest in helping young people, especially those from traditionally marginalised communities, not just be aware of climate change but feel empowered to make a positive response to it.

We spoke to over thirty different organisations from across the videogame sector, social media, museums, festivals, research and local charities. These ranged from local community

bodies to national and international organisations, with differing levels of familiarity with games and cross-sector collaboration. We explored the interest, opportunities and the practicalities of a public engagement gaming initiative focused on climate change.

All the respondents were interested in and saw much potential in the use of videogames and videogame culture. From these consultations and the research, seven strategic opportunities for public engagement with climate science through videogames were identified:

1. **Embracing the Breadth of Videogame Culture** – which thrives in both digital and non-digital spaces including streaming, fan communities, fan-fiction and cosplay. This culture is a rich and collaborative space that can reach diverse audiences.

2. **Harnessing Interest in Videogames to Inspire Engagement with STEAM Skills and Careers -** including coding, animation, music, science, engineering and architecture. This includes understanding their potential applications for future innovation around climate change.

3. **Utilising No-Code Game Design Tools to Open up Participation and Creative Expression -** removing a requirement for technical skills to widen accessibility and enable a more diverse range of communities to creatively explore opportunities for climate action.

4. **Prioritising Local and Hyper-Local Engagement** – focusing on social and environmental concerns of more direct relevance and interest to specific communities, especially those who may be traditionally marginalised and underrepresented in public engagement work.

5. **Incorporating Digital and Non-Digital Access Points** – embracing board games, card games and other physical games alongside videogames to maximise engagement and access.

6. **Deploying Site and Time-Specific Games -** creating projects that are uniquely relevant to different communities and calendar events. This can enable people to interact with their area in new and exciting ways and support engagement with specific communities rather than mass audiences.

7. **Improving Understanding of the Potential of Videogame Culture to Engage Underrepresented Audiences** – a national initiative presents an opportunity to gather data to expand understanding of how well videogames might improve participation of communities traditionally underrepresented in public engagement activities and what approaches might work best. Such new knowledge has the potential to create a lasting impact in public engagement practice and support future innovations in the use of digital technologies and play.

Practical Considerations

Alongside the opportunities, respondents highlighted a range of practical needs and barriers to organisations being able to collaborate on games initiatives. These focused around integration with existing workflows, resource support and leadership.

Organisations in every sector appreciated programmes that could be integrated in their existing workflows, making it easier to be involved. Many working in videogame development highlighted the highly structured development pipelines they work to; those in

Heritage & Arts emphasised their planning schedules with programmes typically defined 12-18 months in advance.

In terms of resource support, needs varied between organisations. Financial support was stressed especially by smaller organisations and those at research institutions with less developed commitments to public engagement. The need for non-financial support was often also highlighted by heritage organisations, charities and community groups interested in being involved with videogames. This reflected challenges both in terms of staff capacity and lack of practical know-how.

Leadership

Many respondents identified a vacuum in engagement leadership across the heritage and arts with respect to climate. Many were excited by the potential role of the UKRI in the development of a programme.

UKRI is uniquely placed to be able to initiate such a flagship national initiative: its networks and strength as a commercially agnostic cross-sector convener enable it to catalyse collaboration between organisations from across a diversity of sectors.

Organisations spoken to during the scoping described not having the networks, skills, funding or capacity to lead or deliver such an initiative. However, they expressed enthusiasm in finding ways they could support and contribute to it.

A public engagement initiative anchored in gaming would multiply opportunities for learning for both UKRI and any participating organisations as well as pioneering new forms of engagement through novel industry and community partnerships.

Conclusion

As videogames have evolved, so too have the ways people interact with them. This is relevant not just to the importance of considering videogames as a media for public engagement but also to opportunities for innovation in the delivery of an initiative focused on climate change.

Technical skills and digital access need not be barriers to working in this space. And there are now multiple avenues for successful engagement beyond the need to produce a single breakout videogame; many of these have the potential to support greater engagement with traditionally marginalised communities.

A national initiative focused on climate change using videogame culture could enable multiple opportunities for learning. It offers an approach for pioneering new forms of engagement. Importantly, and especially following recent global events, it can also help organisations create and explore new links between innovative digital projects, their local spaces and diverse audiences across the UK and beyond.

Videogames and Culture

The growth of digital technology has seen videogames play an ever-greater role as a global cultural force in our lives.

They are now recognised as the most important aspect of youth culture[1]. A recent OFCOM report stated that more 16-24 year olds play videogames than have a social media profile[2].

Their value, both culturally and economically, came into sharp relief during the pandemic in 2020[3], with sales in the UK rising by 29%[4] on the previous year to £7bn and 62% of all UK adults playing videogames during the period[5].

People no longer just play videogames; they also play **with** videogames.

Alongside the streaming of gameplay, live performance, content creation, modding[6] and cosplay[7], games have become social destinations in their own right - including to access other cultural experiences such as music concerts and film screenings.

This presents a significant and mostly untapped opportunity for public engagement.

To date most engagement activities have focused on gamification[8]. However, the number of video games now available for young people to choose from has risen vastly over the last five years. 'Steam', the most popular PC games distribution platform saw 2964 games released in 2015, rising to 10263 in 2020[9].

As a result, investing in the creation of a single videogame as an engagement strategy can be both expensive and high risk - with any output competing with industry behemoths such as *Fortnite.*

Videogames Today

Videogames have evolved almost unrecognisably from their primitive beginnings.

Their economic ascent and ubiquity in contemporary media culture has been well documented. Their technological evolution has also been conspicuous, with games becoming near photo-real experiences and aligning themselves alongside cinema as a leading storytelling medium.

But from a public engagement perspective there are other qualities that videogames have developed that are particularly relevant.

The ways in which people play videogames is constantly changing: home consoles, arcade machines, phones, watches, joysticks, keyboards, touch-screens...all have been used in the delivery of videogames over the years. This relentless reinvention makes them a particularly rich field for innovation and research.

Notably, games have evolved from being a technology that one plays, to one that is played with.

It's a subtle but important distinction.

The idea of games as being formed of fixed rules of engagement with players attempting to reach a prescribed goal has been slowly subverted as alternative models of play have emerged.

Over the decades, videogames have emerged that have wholly ignored traditional ideas of 'scores' and even the concept of 'winning'. *Elite*, originally released for the BBC Microcomputer in 1984 introduced the idea of an 'openworld[10]' videogame.

With no prescribed goal, players were free to act of their own free will in an apparently huge galaxy, making their own moral choices. This concept was developed most famously in *Grand Theft Auto*, with *GTA V* (2013) becoming one of the biggest selling media products of all time.

As the case-studies detailed in this report also explore, videogames are incredibly effective simulations. They allow players to

explore potentials, model contingencies and rehearse solutions to problems.

SimCity laid the groundwork for this genre of game in the 1980s, and is still going strong.

Games are places to be creative

Many of the most popular videogames in the world are intrinsically ABOUT exploring the player's creativity.

Minecraft, one of the most popular videogame phenomena of recent years has modes with no score, no lives, no objective; it's simply a place to play (and was purchased by Microsoft for $1.6 billion).

They are also creative spaces that convene people. *Roblox*, a rapidly growing multi-user space measured 33.4 million daily users in Q2 2020.

Dreams, created for PlayStation by Guildford-based Media Molecule, empowers players to create and share their own rich creations with each other on a Sony Playstation - once the province of only professional creators.

Millions are watching people playing videogames

Whilst competitive e-sports are a rapidly accelerating new spectator activity, of equal interest and importance is the emergence of streaming content in and around non-elite competitive activity.

Twitch, the most popular live streaming platform registered 2.1 billion hours of viewed content in Feb 2021[11].

YouTube and Facebook are also important locations for the creation and consumption of videogame-related culture.

This content is strikingly varied and created by and for diverse audiences. Videos feature people talking, playing, critically examining, exploring, experimenting and staging entire events inside videogame worlds.

Games today aren't just for playing but for creating, watching and reinventing.

Videogames and Climate: A brief history

Given the centrality of videogames within mainstream popular culture since the 1970s, it is unsurprising to find that game designers and developers have made use of this powerful interpretative medium to explore issues and themes of contemporary social, cultural, political and economic significance.

Whether these be anxieties around weapons proliferation during the Cold War era as made manifest in arcade and console games such as *Missile Command* (Atari, 1980); concerns over 'post truth' alternative facts and fake news as

meditated upon in games such as *Metal Gear Solid 2* for the PlayStation 2 (Konami, 2001); or issues of online bullying and teen suicide as explored in the mobile/multiplatform *Life is Strange* (Square-Enix, 2017).

What is altogether more surprising, however, is how infrequently the topic of climate change has been investigated, either centrally or tangentially, within mainstream games.

As such, while for many decades, mainstream narrative films such as *Soylent*

Green (1973), *Blade Runner* (1982), *Waterworld* (1995), and *AI* (2001) have directly tackled the causes and implications of the greenhouse effect, global warming, flooding and the melting of the polar ice caps, it is mostly within the genre of turn-based strategy/simulation games that mainstream videogame design and play has addressed such topics.

Games such as *SimEarth* (Maxis, 1990), *SimCity Societies* (Electronic Arts, 2007) and the *Civilization* series (Micro Prose, 1991-present) build various environmental variables such as the effects of sea level rise, global warming and cooling, and pollution into their world-building and management models.

However, as we note in our case studies, these games have placed varying levels of importance on environmental factors in different iterations and releases over the course of the series.

Interestingly, then, despite a preponderance of broadly dystopian settings for games, the comparative absence of climate change as a key theme within mainstream videogame design and play means that, historically, it has not been an especially significant theme within the broader discourses of gaming culture, criticism and communication.

This situation, however, has changed considerably in the last few years which have witnessed a surge in independent game developers directly addressing issues of climate change through their work both in the commercial and educational game development space. This work is very often more demonstrably politicised and places the complexities of decision making, the

interpretation of climate change science principles and data, as well as the effects of action and inaction at its very heart.

In the following case studies, we explore a range of different contexts in which a variety of stakeholders including game designers, educators, students, climate scientists, activists and artists have made use of the persuasive nature of digital games to engage and communicate their message. We note also the important work happening in the 'analogue' game sector with tabletop, card and board game creators similarly turning their attentions to climate change as a central theme to address through designs.

Alongside these developments and contexts, it is also important to recognise current videogame industry advocacy and campaigning around climate change such as the '*Playing for the Planet*' initiative that specifically responds to the environmental impacts of the game design pipeline and infrastructure.

An important coda to this work is the underlying technological dependencies of digital gaming and the impact of obsolescence and incompatibility not only on the sustainability of development practice but also on our very ability to access and play these games in the future.

As we shall see, some exemplars of climate change game design such as the BBC-funded *Climate Change Challenge* (2014) are already difficult if not impossible to play on modern devices as they were developed using technologies such as Adobe's 'Flash' platform which is no longer in development, no longer supported, and incompatible with contemporary mobile phones and tablets.

Case Studies

Mainstream Games

Despite the large number of games across all genres that broadly locate their action in the dystopian or even post-apocalyptic futures of popular science fiction film and literature, it has been the strategy/simulation genre that has seen developers of mainstream commercial videogames most explicitly reference climate change.

Often drawing on the aesthetics and game mechanics of their tabletop/board game counterparts, strategy videogames are based around the management and development of resources and typically position the player in a 'God-like' perspective of oversight and control.

They present as complex simulations, building economic, technological, political, and environmental factors into their models.

Typically, climate change is presented as the undesirable, even unavoidable, consequence of industrialisation.

Researching and developing fossil fuels or developing technologies that lead to the invention of the automobile, for instance, might have the in-game effect of increasing pollution which might, in turn, impact upon the happiness and productivity of virtual citizens or impact upon the utility of land.

Gameplay often allows negative environmental impacts to be mitigated through clean-up activities and the development of new technological solutions such as cleaner energy production, for instance. In many strategy games, players are provided with options to reduce the frequency of potentially game-ending natural disasters or even deactivate them altogether.

Civilisation
1991

Developer:
Maxis
Publisher:
MicroProse, Activision, Hasbro Interactive, Infogrames, 2K Games
Platforms:
Multiple console, computing and mobile platforms

First released in 1991, Civilization is a series of strategy videogames with six major releases that are augmented by expansion packs. The initial releases included a mechanic that connected the development of in-game industry with the production of carbon and pollution that required cleanup or mitigation. Subsequent releases diminished the role of climate within the game to the point where Civilization 5 (2010) included no climate change mechanic at all. 2016's Civilization VI initially released without climate change included in its simulation but this was added in 2019 via the optional 'Gathering Storm' additional cost expansion pack. (Image credit: 2K Games)

SimEarth
1990

Developer:
Maxis
Publisher:
Maxis
Platforms:
Mac, DOS, Windows and multiple videogame consoles

Following the commercial and critical success of SimCity, developer Maxis zoomed out to give the player a global perspective and responsibility. 'Think globally', ran the game's 1990 advertising copy, 'Instead of a city to run, SimEarth gives you the reins to the entire planet. Evolution, continental drift, climate, atmosphere, hurricanes, nuclear fallout, acid rain and a bunch of other disasters. All the cool stuff you need to rule the world.' The game was designed by Will Wright with James Lovelock acting as an advisor. The influence of Lovelock's Gaia theory can be seen in the design of the game's simulation and its presentation of Earth as a complex, synergistic system. (Image credit: EA/Maxis)
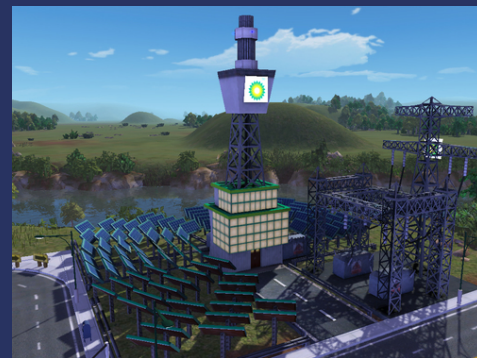
SimCity Societies
2007

Developer:
Tilted Mill Entertainment
Publisher:
Electronic Arts
Platforms:
Windows PC

According to Steve Seabolt, VP of Global Brand Development at EA, SimCity Societies' focus on climate change gave the developers the 'opportunity not only to demonstrate some of the causes and effects of global warming, but also to educate players how seemingly small choices can have a big global impact.' What is most notable about SimCity Societies, and the 2007 press release this quote is excerpted from, is the partnership between EA and BP in the game's creation. The release continues, "The time was right for this partnership. EA was developing the next iteration of the SimCity series at the same time that we were looking for opportunities to raise awareness about low-carbon power choices," said Carol Battershell, Vice President, BP Alternative Energy. "EA has a powerful reach to the next generation and BP has a suite of low-carbon power alternatives. In our collaboration through this innovative game, we can provide education on the issues surrounding climate change, its association with carbon emissions and the ability to take early positive action through low-carbon power choices." The partnership manifests in the game through the branding of alternative energy power stations with the BP logo while fossil fuel energy sources are left unbranded. (Image credit: EA)

Independent Games

The term 'independent' (or more typically 'indie') is a somewhat slippery term in the context of videogame development. It might describe a situation in which there is no financial or technical support from a mainstream publisher through versions of self-funding and crowdfunding, to contexts in which development and distribution are financially backed by a traditional videogame publisher but in which some greater degree of creative freedom exists than in the 'mainstream' development/publishing relationship context.

For our purposes here, we focus less on the minutiae of financial independence and more on other qualities of indie gaming, namely that development teams tend to be significantly smaller (perhaps even individuals) and that it is putatively possible to experiment, innovate and take risks. While it is not inevitable, it is often the case that independently-developed videogames are more tightly focused in scope perhaps being based around a single core mechanic or theme. In contrast with the mainstream development sector, climate change has provided the inspiration and central theme for a comparatively large number of independently-developed videogames in recent years. Indeed, even the most cursory search of indie-focused digital distribution platforms such as itch.io reveals a plethora of environmentally-themed games developed by small teams in the past few years.

Endling: Extinction is forever
2021

Developer:
Herobeat Studios
Publisher:
HandyGames (subsidiary of THQ Nordic)
Platforms:
Steam, PlayStation 4, Xbox One, Nintendo Switch

Dubbed an 'eco-conscious survival game' and with the subtitle 'Extinction is forever', Handy Games' Endling puts the player in the role of the last mother fox attempting to keep their cubs alive in the wake of environmental catastrophe. Spanish developer Herobeat Studios describes itself as a 'Guerilla Collective' and presents Endling as a 'meaingful video game for change and environmental awareness'. The game's marketing and framing emphasises the urgency and extent of human impact on the environment and ecosystem of these animals: 'devastated environments based on real current issues'; 'Experience what life would be like in a world ravaged by mankind through the eyes of the last fox on Earth in this eco-conscious adventure.' 'Discover the destructive force of the human race, as it corrupts, pollutes and exploits the most precious and valuable resources of the natural environments day after day.' (Image credit: THQ)

Bee Simulator
2019

Developer:
Varsav Game Studios
Publisher:
Bigben Interactive, Nacon
Platforms:
PC, Xbox One, PlayStation 4, Nintendo Switch

Framed as an arcade action adventure game and set in New York's Central Park, Varsav Game Studios' Bee Simulator offers to let the player 'Explore a world brimming with life in which you collect pollen, defy dangerous wasps and save your hive.' However, beyond the myriad bee-related puns in its marketing materials, Bee Simulator also locates its gameplay within the contemporary discourse around the impact of climate change, habitat destruction and colony collapse. Noting the influence of the books 'Bees' by Piotr Socha and 'The Life of the Bee' by Maurice Maeterlinck, lead developer Lukasz Rosinski has spoken of the balance between delivering an enjoyable arcade experience with an educational message about the plight of bees and potential solutions and actions that can be taken both in and out of the game. (Image credit: Bigben Interactive)
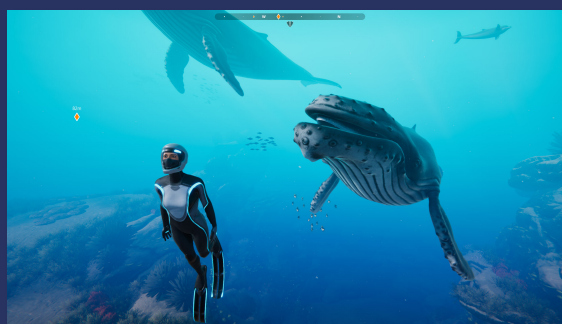
Beyond Blue
2007

Developer:
Tilted Mill Entertainment
Developer:
E-Line Media
Platforms:
PC,Xbox One, PS4, Apple Arcade

E-Line Media's Beyond Blue is an adventure
game that puts the player in the role of a deep sea researcher leading a team of marine scientists aiming to better understand marine ecologies and, in particular, the diversity of marine life. E-Line Media describes itself as a videogame developer and publisher passionate about harnessing the power of games to help players understand and shape the world. Squarely located within the world of the Blue Planet II BBC TV documentary series, the game is the result of a partnership with BBC Studios and OceanX Media. In addition to drawing on scientific advisors during development, Beyond Blue incorporates documentary video clips recorded by the BBC's Blue Planet II. These clips are built into the game's reward system and are unlocked through gameplay and exploration.
(Image credit: E-line Media)

Educational Games

While, in principle, all games, whether digital or analogue, can be utilised in formal and informal educational contexts, it is important to distinguish those games that specifically set out to support learning through developing knowledge or the acquisition and application of skills. While there may seem to be a comparatively fine line between educational games and the kinds of formal collaborations between videogame developers and climate scientists (such as we saw in the case of James Lovelock's advice and input to SimEarth), we make the distinction primarily to highlight the specific educational claims made by certain games along with the contexts in which they might be developed and used. In this way, while other games might have educational value, 'educational games' are designed and marketed with this as their primary purpose.

As such, these explicitly educational games very often bring together different stakeholders in their commissioning, development and funding. NASA's Climate Kids project is a case in point and we will see in our case studies examples of BBC funding in the UK context, for instance. Importantly, educational games based around developing knowledge and understanding of climate change typically place considerable emphasis on the credentials of their creators and the validity of the data and climate science upon which their models and gameplay are based which often sees the manifest foregrounding of stakeholders such as university research labs as (co-)creators. Interestingly, as we will see in our case studies, projects take markedly different approaches to complexity, data visualisation and different responses to the presence of political negotiation and even climate denial discourses.

Climate Challenge
2006

Developer:
Red Redemption
Publisher:
BBC
Platforms:
Web/Flash

Released in 2006, Climate Challenge was a game based around global warming. Developed by Red Redemption and produced by the BBC, the game ran on Adobe's Flash web platform meaning that it is now unplayable on modern computing devices. Interestingly, the accompanying BBC website positions Climate Challenge as a learning tool and while noting that, 'Wherever possible, real research has been incorporated into the game', strikes a cautionary tone that draws attention to a tension between game and educational resource in suggesting that, 'The producers' primary goal was to make a fun, challenging game. At times it was necessary to strike a compromise between strict scientific accuracy and playability. For this reason, Climate Challenge should not be taken as a serious climate change prediction.' (Image credit: BBC)

Fate of the World
2011

Developer:
Red Redemption
Publisher:
Soothsayer Games
Platforms:
Windows and Macintosh

Developed by Red Redemption who had previously created the BBC's Climate Challenge web/Flash game, Fate of the World is a turn-based strategy game that seeks to simulate the effects of global warming on the Earth. Central to the development and marketing of the game is the collaboration with Oxford University climate scientist Prof. Myles Allen whose climate projection models were used to inform the game's simulation. The game is based around distinct scenarios set between 2020 and 2200 and require players to manage natural resources and climate alongside the needs of an expanding global population. Fate of the World makes great play of the complexity of its scientific model with its 'detailed real-world data', 1000 'impacts' (including storms, floods, heatwaves, flash fires, desertification, glacial melt, sea level rise, resource wars, dissidence and political backlash and 100+ policies, including geoengineering, diplomacy, species protection, energy choices, population, politics, and clandestine operation). The game remains available via the Steam platform with the tagline, 'Will you help the whole planet or will you be an agent of destruction?' (Image credit: Soothsayer Games)

Infrared Escape
2018

Developer:
Earthgames
Publisher:
Earthgames
Platforms:
Android, iOS, itch.io

Where Red Redemption's Fate of the World foregrounds complexity, the outputs of the University of Washington Earthgames group take a markedly different approach. Infrared Escape is a case in point being based around the journey of an infrared light beam avoiding greenhouse gases through the atmosphere to escape into space. The simplicity of this game design mirrors Earthgames' Dargan Frierson's research specialism in simplified models for improving the understanding of climate processes. The approximately 10 minute long game encourages players to learn about the impacts greenhouse gases have on warming our planet and how greenhouse gases in the atmosphere have changed over time due to anthropogenic warming. As the game moves through pre-industrial past to a more polluted future, it becomes more difficult to navigate the beam on its journey. However, unlocking tools like the 2016 Paris Climate Agreement reduce emissions of greenhouse gases and make the game easier to play. The game is accompanied by a downloadable teachers guide setting out the game's objectives and learning goals. (Image credit: Earthgames)

Analogue Games

Although the primary focus of this report is videogames, it would be remiss not to draw attention to non-digital games. This is, in part at least, due to the recent resurgence in popularity in what are now known collectively, and clumsily, as 'analogue games'.

While recognising this increased popularity and visibility, it is, of course, notable that the cultural and economic dominance of digital games has seen to it that, even though they might precede them, board games, tabletop games and card games need now be differentiated in this manner. Indeed, so prevalent is digital play in popular parlance that while board games are re-demarcated as 'analogue', the words 'game' and 'videogame' have become practically synonymous.

This notwithstanding, the analogue game space has (re)emerged as a particularly vibrant and important one with an independent development scene fuelled by crowdfunding, 3D printing for the fabrication of pieces and (perhaps ironically) digital gameplay prototyping, testing and sharing tools.

As is the case in the independent videogame development context, a number of analogue game makers have similarly sought to tackle questions of climate change through their designs. While the nature of the form means that the simulation model that underpins an analogue game is unlikely to be able to achieve the complexity of the most sophisticated computer simulation, the analogue game has one potential benefit in that its rules are made manifest rather than being potentially hidden within the 'black box' of the computer or games console running inaccessible code and invisibly processing data. It follows that, not only are the rulesets and systems more potentially accessible and knowable to the player of the analogue game, they are also potentially more readily adapted and modified in order to explore different contexts or conditions.

CO2 Second Chance
2018

Developer:
Vital Lacerda
Publisher:
Stronghold Games/giochix.it

CO2: Second Chance is a boardgame designed by Vital Lacerda. The game is for 2-4 players aged 14+ with play sessions intended to last approximately 1-2 hours. The game places each player in the role of CEO of an energy company responding to government requests for new, green power plants. The goal is to meet the increased demand for sustainable energy whilst reducing pollution and maximising profits. Gameplay is based around the management of UN-granted Carbon Emission Permits (CEPs) which are spent each time a new energy plant is created and may be traded in the game's internal marketplace. CO2 second chance builds on earlier boardgames by adding a cooperative gameplay mode and a solo game based around the achievement of specific goals. Two simultaneous crowdfunding campaigns ran on the Giochistarter and Kickstarter platforms and the game is now available through retail outlets. (Image credit: Stronghold Games)

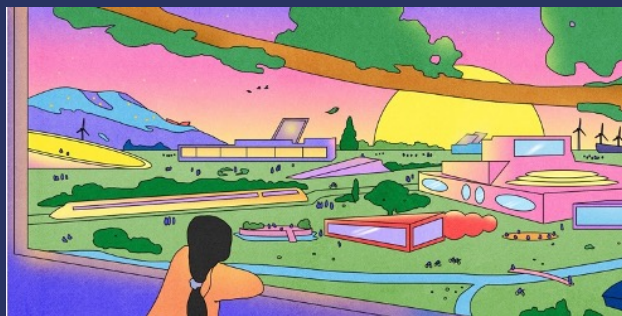# Daybreak
2018

Developer:
Matt Leacock and Matteo Menapace
Publisher:
CMYK
Platforms:
Boardgame

Daybreak (formerly known as Climate Crisis) is a cooperative game about climate action that is currently in development. The game positions each player as the leader of a world power, deploying policies and technologies to break the cycle of global heating and build safe, resilient societies. If the global temperature gets too high, or if too many people are put in danger, everyone loses. The aim of the game is, through collaboration, to reduce global emissions to net zero. Although the game remains unreleased, it has garnered considerable media coverage in part because one of its designers is the creator of the influential Pandemic boardgame. One consequence of this coverage in outlets including Wired and the New York Times is the discussion of boardgames and the role of play in the public understanding of climate change. We also include it here as the designers are actively soliciting input into the game through a call on their website. 'We're looking for folks who have experience in climate advocacy, policy, science, engineering, art, or games to help us make Daybreak the best it can be. We're especially interested in support from people based or rooted in the Global South.' (Image credit: CMYK Games)

Carbon City Zero / Carbon City Zero: World Edition
2019/20

Developer:
Sam Illingworth, Paul Wake and Possible
Publisher:
10:10 Foundation

Building on the initial Carbon City Zero card game designed by Dr Sam Illingworth and Dr Paul Wake of Manchester Metropolitan University and funded by UK Energy Research Centre (UKERC), the World Edition is a collaborative deck-building game, in which players develop a sustainable city. Designed for 1-4 players, Carbon City Zero's premise states that, 'The planet is in a climate crisis. For decades governments have ignored it. Now it's up to a group of city mayors to sort it.' With the aim of creating a sustainable city, each player starts with an identical deck, buying additional cards from a shared marketplace and collaborating and negotiating with other cities around the world. Gameplay involves balancing income generation with carbon reduction, and co-operation between governments, industries, and the public. Carbon City Zero is designed so that there are multiple paths to the victory state of collective survival, though collaboration is placed at the heart of the game. The focus on collaboration in the World Edition of the game is notable as the first release Carbon City Zero was a wholly competitive multiplayer game which, as Alice Bell co-director of Possible, notes, 'the message which came out of our player focus groups was really clear – the crisis isn't experienced or tackled in isolation, so the gameplay has to be cooperative to reflect that, as well as being international.' (Image credit: 10:10 Foundation)

Game Jams

Drawing on the musical concept of the 'jam session' in which a group of musicians compose through improvisation and evolving collaboration with little or no preparation, a game jam describes a context in which individuals or teams attempt to create an original videogame from scratch.

Game Jams vary considerably in format but a key characteristic is that they are intensive and take place over a comparatively short period of time ranging from 24 to 72 hours. Originating in 2002 (when what is now known as the 0th Indie Game Jam was founded by Chris Hecker and Sean Barret), game jams have become a staple of development conferences, higher and further education, partly because they foster creativity and innovation but also because they are based around dominant industry principles and approaches such as rapid prototyping, fast failure and literature design.

Organisations such as Global Game Jam co-ordinate international game jams - taking place across a record-breaking 934 locations in 118 countries in 2020 (before moving to an online-only format during the pandemic). It is supported by game development companies, publishers and platform holders, including Unity, Unreal Engine, Microsoft, Sony Interactive Entertainment. Throughout the year there are also many local and hyperlocal game jams organised within universities, schools and museums.

For our purposes in this report, game jams offer a number of important qualities. Because they are based around individuals and small teams working over a short period of time, there is the potential for a large number of games - or sketches and game ideas - to be produced, shared and evaluated. Moreover, game jams are very often, though not always, organised around a theme with climate change providing the focus for events such as:

- **Climate Jam 2018** (supported by The Welsh Crucible, Bangor University, Cardiff University, Cardiff Metropolitan University, the Natural Environment Research Council, the Sêr Cymru II programme and Swansea University).

- **Games For Change Student Challenge** (supported by the US Department of Commerce National Oceanic and Atmospheric Administration)

- **IndieCade Climate Jam 2020** (supported by Niantic, Riot Forge)

- **The Green Mobile Game Jam** (Playing for the Planet Alliance)

Industry Campaigning

It is an unavoidable fact that the production and distribution of videogames brings with it a number of environmental challenges.

The carbon footprint of the industry is significant with game development, physical and digital distribution channels all contributing to energy use.

While organisations are making their own pledges and commitments including Microsoft's plan to be carbon negative by 2030[12] and Sony working towards a zero environmental footprint by 2050[13], and studios such as UsTwo Games pledging to reduce carbon emissions and introduce green nudges into game design[14], for instance, there is recognition that coordination and better information sharing is required and a number of industry-led initiatives exist that seek to address these issues.

By way of example, the International Game Developers Association (IGDA) has established a 'Climate' Special Interest Group which focuses on building a Climate Guide 101 for game developers; game design patterns; industry benchmarking; and climate council advocacy.

Similarly, facilitated by the UN Environment Programme with the support of GRID-Arendal and Playmob, and launched during the Climate Summit at UN Headquarters in New York, Playing for the Planet is an industry-led initiative focusing on commitments from its Alliance of partners that include Twitch, Ubisoft, Rovio, Sports Interactive.

As the project website notes, 'members have made commitments ranging from integrating green activations in games, reducing their emissions and supporting the global environmental agenda through initiatives ranging from planting millions of trees to reducing plastic in their products.'

In August 2021 UKIE (a trade body for videogames in the UK) also announced a collaboration with Playing for the Planet, alongside ISFE (the Interactive Software Federation of Europe). Ahead of COP26, their 'Green Games Summit[15]' aims to 'bring the international games sector together to share knowledge, discuss and shape the industry's approach to the climate crisis and sustainability'.

Games and engagement with underrepresented audiences

"Some groups in society have many more opportunities to participate in activities related to research and innovation than others. We are committed to closing this gap through our public engagement programmes and partnerships."

UKRI Vision for Public Engagement, 2019[16]

With a commitment to supporting equality, diversity, and inclusion, UKRI seeks to work with organisations to improve how they engage with communities currently underrepresented in their existing activities. This includes considering the reach and inclusivity of activities across ethnicity, socio-economic background, disability, sex and age.

With that in mind there is an interest to understand what games could uniquely offer to support engagement with traditionally underrepresented communities.

Existing player data provides some (albeit limited) insights into current videogame audiences, particularly around age and gender. For example, in 2021 Ofcom reported similar levels of game playing in men and women at 61% and 63% respectively[17]. However while they were equally likely to play games they did so in different ways, with men more likely to use consoles and women smartphones. In short, game genre and platform influence player demographics.

Within the games industry, many are working to improve the diversity of representation within games – and within the games workforce[18] [19]. And audiences are building around games, characters and stories more reflective of and relevant to their particular communities and interests[20].

This suggests the potential is certainly there for games to engage a diverse range of communities, including those traditionally underrepresented in existing engagement work. However, as with all engagement activities, to stand the greatest chance of success those experiences should be designed with the specific audience in mind from the start and an understanding of the community embedded in the creative team and process.

This applies also to mitigating the impacts of digital exclusion on participation in engagement initiatives.

Games can of course now be played on a wide variety of devices. The widespread ownership of smartphones in the UK means they can enable inclusion of communities who might not have access to PC or console experiences[21].

However, there is still a significant proportion of the population who risk being excluded, even with smartphone-based activities. There may be many reasons for this including access to equipment, skill or limited interest[22]. Ensuring non-digital alternatives are not just available but core to engagement initiatives around games (rather than a peripheral add-on) is crucial to avoid exacerbating the impacts of such digital exclusion.

The Potential of Games in Public Engagement

With this background of collaboration between videogames and climate science, and interest in the potential for engaging diverse audiences, we spoke to over thirty different organisations from across the videogame sector, social media, museums, festivals, research and local charities.

These ranged from local community bodies to national and international organisations. Familiarity with games varied considerably, as did experience collaborating with organisations in different industries on initiatives.

We explored the interest, opportunities and the practicalities of a potential public engagement games initiative focused on climate change.

All the respondents expressed interest in and saw much potential in the use of videogames and videogame culture. Common threads of interest and opportunity emerged. A range of practical needs and barriers to organisations being able to harness these and collaborate on games initiatives were also highlighted.

These opportunities and needs are summarised below.

The Opportunities

From the above research and consultation, seven strategic opportunities for public engagement with climate science through videogames were identified:

1. Embracing the Breadth of Videogame Culture

Understandably most engagement approaches through videogames have historically focused on the creation or playing of a game. However, as highlighted, with so many new games released each year there is intense competition for players' attention.

Modern video game culture though provides opportunity for a wider range of access points, including streaming, music, fan-fiction, fan-art[23], cosplay and modding. This culture is a rich and collaborative space that can reach diverse audiences and enable engagement professionals to work with existing players' interests rather than competing with them. Working with a wider variety of entertainment platforms, it can also reach beyond those who self-identify as gamers.

> *"Working with the breadth of available videogame culture is definitely smarter than trying to make a single, successful game"*
>
> **Dan Pinchbeck, CEO, The Chinese Room**

2. Harnessing Interest in Videogames to Inspire Engagement with STEAM Skills and Careers

The creation of videogames involves a wide range of skills and disciplines. For those already excited by videogames, this provides a pathway to inspire engagement with STEAM subjects.

"Videogames are a fantastic gateway for STEAM engagement, inspiring interest in how they are made and reaching an ever growing, diverse audience. They inspire young people to discover new potential in themselves"

Rick Gibson, CEO, The BGI

Many organisations already embrace this, often with a focus on teaching coding and animation skills. However, the multidisciplinary nature of game development provides a way into a greater diversity of subjects beyond those traditionally associated with games, including music, science, engineering and architecture.

In the design of such skills-development programmes, opportunity exists to expand understanding of the transferable nature of these skills, their wider applications and the career opportunities they afford. This includes understanding their existing uses as well as inspiring future innovation around climate change.

3. Utilising No-Code Game Design Tools to Open Up Participation and Creative Expression

Coding know-how or interest need not be a barrier to engagement through videogames. The existence of creative tools that do not require technical skills presents an opportunity to widen accessibility and enable local communities and heritage organisations such as museums and galleries to creatively explore opportunities for climate action.

"Using low-code tools like Twine are great ways to introduce people to the systems and concepts behind videogames, giving them a fast-track to being able to express themselves through game design"

Tara Mustapha, Founder, Code Coven

4. Prioritising Local and Hyper-Local Engagement

With many climate action campaigns focusing on conceptually distant and seemingly insurmountable global challenges, the potential of a local and hyper-local focus is an appealing distinction.

It presents an opportunity to focus on social and environmental concerns of more direct relevance and interest to specific communities, especially those who may be traditionally marginalised and underrepresented in public engagement work.

"Meaningful local engagement is critical. It's always interesting to connect the local to national activities... to see the passions that emerge when things connect nationally. It creates a different kind of relevance to the local experience"

Syima Aslam, Bradford Literature Festival

A local focus also enables attention to be drawn to specific research and innovation work being funded and undertaken in different regions of the UK.

5. Incorporating Digital and Non–Digital Access Points

Access to digital technology can be an obstacle to participation in or delivery of videogame initiatives. However, contemporary videogames exist in close cultural proximity to analogue games such as board games and card games.

"Videogames are just a part of a whole ecosystem of play which is growing increasingly connected. Using analogue games, table-top, cards and even playground games is a huge help to access"

Strategic Director, major AAA games studio

Embracing them broadens accessibility for participants and engagement professionals, whilst enabling many similar opportunities for skills development, creative expression and engagement with social, health and scientific issues.

6. Deploying Site and Time–Specific Games

Site and Time-Specific games offer the potential for unique experiences that are tailored for specific communities and interests.

They can bring in new audiences as well as providing incentive for repeated engagement.

"Using videogames as site-specific elements of programming is a really interesting approach to public engagement"

Sam Hunt, Festival UK

This can be seen with the growth of seasonal and cultural events within videogames such as *Fortnite* and *Animal Crossing: New Horizons.*

In the physical world, they can encourage people to interact with their local area in new and exciting ways. Hyper-local projects can be created that are uniquely relevant to communities who may be traditionally marginalised and around particular calendar events: in essence supporting engagement with *specific* rather than *mass* audiences.

7. Improving Understanding of the Potential of Videogame Culture to Engage Underrepresented Audiences

Videogame culture already has enormous reach. Through the diversity of content and platforms available, games can engage a wide array of audiences with differing interests, abilities and access. With that in mind, for those trying to reach communities traditionally underrepresented in their public engagement activities, games culture offers up an exciting opportunity.

However, the evidence base for how well videogames can achieve this and an understanding of the approaches that might work best, is limited. A potential national initiative presents an opportunity to gather data to expand this understanding as well as identify gaps and challenges. Such new knowledge could create a lasting impact in public engagement practice and support future innovations in the use of digital technologies and play.

Practical Considerations

Alongside the opportunities, respondents highlighted a range of practical needs and barriers to organisations being able to collaborate on games initiatives. Aspects for attention focused around integration with existing workflows, resource support and leadership:

Integration with existing workflows

Organisations in every sector identified the need for participation in any initiative to be low-impact on their existing workflows. Many working in videogame development stressed the highly structured development pipelines that they work to and emphasised that collaboration on initiatives needed to be able to fit easily into these.

This was mirrored in the Heritage & Arts sector. Many organisations described that in an 'ordinary year' they would have programmes largely defined for the next 12-18 months. In a particularly unpredictable programming environment post-COVID lockdown, a flexible model of participation in initiatives was noted as being very valuable.

However, these needs aside, the value of involvement in an initiative around sustainability was underlined by many. Respondents identified the desire to give outlet to the growing engagement in the sustainability agenda amongst their own workforce.

Resource Support

For those working in research, barriers to participation in initiatives varied greatly between institutions. Those with economic constraints or less developed commitment to public engagement stressed the need for additional resource, particularly financial, to enable participation.

For heritage organisations, charities and community groups, the need for non-financial resource support was often also highlighted. Though there is great interest in involvement with videogames, a lack of practical know-how was noted as a barrier. For some, training of their existing staff was of interest. For others, especially smaller charities and community organisations, there was greater interest in others coming in to deliver activities with their communities.

Leadership

Many respondents identified a vacuum in engagement leadership across the heritage and arts with respect to climate. Many were excited by the potential role of the UKRI in the development of a programme.

UKRI is uniquely placed to be able to initiate such a flagship national initiative: its networks and strength as a commercially agnostic cross-sector convener enables it to catalyse collaboration between commercial competitors and organisations from across a diversity of sectors including academia, business and local community groups.

Organisations spoken to during the scoping described not having the networks, skills, funding or capacity to lead or deliver such an initiative. However, they expressed enthusiasm in finding ways they could support and contribute to it.

A public engagement initiative anchored in gaming would multiply opportunities for learning for both UKRI and any participating organisations as well as pioneering new forms of engagement through novel industry and community partnerships.

Final Thoughts

Videogames are a global cultural force. Relentless technological and creative innovation alongside the core consideration of the player in the game design process has propelled the sector's expansion.

No other media exhibits quite such a mutability of form and purpose. And indeed as videogames have evolved, so too has how people engage with them – not just playing videogames, but playing *with* them in other media and in other areas of our lives.

This is relevant not just to the importance of considering videogames as a media for public engagement but also to opportunities for innovation in the delivery of such an initiative focused on climate change.

As this report has highlighted, there are now multiple avenues for organisations to engage audiences through videogames, including through use of user-friendly digital technologies and non-digital experiences. At the very least, the approach to climate engagement through videogames should not rely on the development of a single breakthrough game.

There is undoubtedly potential for a UK-wide initiative. However, success requires coherence and leadership.

UKRI is ideally placed to spearhead this. Its role within the research and cultural community makes it uniquely placed to convene organisations across sectors and explore the potential of these technologies to enable greater public collaboration and co-production.

In considering how public engagement should evolve to the world in which we now live, such an initiative could enable multiple opportunities for learning. It offers an approach for pioneering new forms of engagement. Importantly, and especially following recent global events, it can also help organisations create and explore new links between innovative digital projects, their local spaces and diverse audiences across the UK and beyond.

OKRE

OKRE is a charity and global hub of expertise bringing together the research sector, entertainment industries and personal lived experience. Through facilitating better cross-sector collaboration, OKRE supports the creation of fresh ideas and new content, with the mission to expand people's understanding of the world.

UK Research and Innovation

Big challenges demand big thinkers - those who can unlock the answers and further our understanding of the important issues of our time. Our work encompasses everything from the physical, biological and social sciences, to innovation, engineering, medicine, the environment and the cultural impact of the arts and humanities. In all of these areas, our role is to bring together the people who can innovate and change the world for the better.

We work with the government to invest over £8 billion a year in research and innovation by partnering with academia and industry to make the impossible, possible. Through the UK's nine leading academic and industrial funding councils, we create knowledge with impact.

1. www.theguardian.com/commentisfree/2021/jan/11/video-games-music-youth-culture

2. https://www.ofcom.org.uk/__data/assets/pdf_file/0025/217834/adults-media-use-and-attitudes-report-2020-21.pdf

3. "Videogaming is at an all-time high…" : https://www.nielsen.com/us/en/insights/article/2020/3-2-1-go-video-gaming-is-at-an-all-time-high-during-covid-19/

4. UK Consumer games market valuation : https://ukiepedia.ukie.org.uk/index.php/UK_Video_Games_Market#2021_Stats

5. OFCOM Adult media use and attitudes 2020-21 : https://www.ofcom.org.uk/__data/assets/pdf_file/0025/217825/children-and-parents-media-use-and-attitudes-report-2020-21.pdf

6. Modding: 'Modifying' videogames is the deliberate altering of an original videogame by a third-party. Often this can be encouraged by the creators, sometimes going as far as to provide tools and documentation to help fans produce their own 'mods'. Modding can also be an unsanctioned, subversive act.

7. Cosplay: Short for 'costumed play', Cosplay is a popular fan activity of dressing up as a particular character from a videogame / movie/ manga / comicbook world. Often twinned with role-playing and performance, Cosplay is a popular activity at festivals and conventions.

8. Gamification: The application of game-design mechanics and principles to non-game contexts. Gamification techniques are often linked to persuasion and have been deployed in marketing, political campaigns and recruitment campaigns.

9. Number of games released on Steam worldwide from 2004 to 2020 : https://www.statista.com/statistics/552623/number-games-released-steam/

10. Openworld: A game design that provides players with the autonomy to approach the environment and challenges of the game in their own way, a bias toward the removal of strict rules and structures.

11. TwitchTracker : https://twitchtracker.com/statistics

12 https://blogs.microsoft.com/blog/2020/01/16/microsoft-will-be-carbon-negative-by-2030/

13 https://www.sony.com/en/SonyInfo/csr/eco/RoadToZero/gm_en.html

14 https://playing4theplanet.org/ustwo-games/

15 www.askaboutgames.com/news/green-games-summit-ukie-isfe-and-playing-for-the-planet-team-up-to-launch-new-event-tackling-climate-change-in-games

16 https://www.ukri.org/wp-content/uploads/2020/10/UKRI-1610202-Vision-for-public-engagement.pdf

17 https://www.ofcom.org.uk/__data/assets/pdf_file/0025/217834/adults-media-use-and-attitudes-report-2020-21.pdf

18 https://www.theguardian.com/technology/2017/mar/15/video-game-industry-diversity-problem-women-non-white-people

[19] https://www.womeninstem.co.uk/gaming/how-diversity-and-inclusion-is-driving-the-games-industry-forward/

[20] https://www.inverse.com/gaming/spider-man-miles-morales-ps5-harlem-diversity-inclusion

[21] https://www.ofcom.org.uk/__data/assets/pdf_file/0025/217834/adults-media-use-and-attitudes-report-2020-21.pdf

[22] https://www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristics/homeinternetandsocialmediausage/articles/exploringtheuksdigitaldivide/2019-03-04

[23] Fan-fiction/art: Creative stories or art produced in an unofficial, amateur capacity based on an existing fictional world. Whilst these works are often technically copyright infringements, they are usually (but not always) accepted as a valuable part of fan culture.