Reversing Cyber Loneliness

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Abstract: After more than thirty years we reopen the folder of immersivity in a social dimension enabling creatives to express themselves in open public spaces. Is "immersivity" an interesting and innovative "communicative experience" to be enjoyed together with other citizens, breaking cyber-isolation. This paper describes a interdisciplinary Horizon Europe research project aimed to design and develop a cost effective, hassle-free, easy to install and tune solution to setup a multi-user, multi-site, multi-platform non-invasive immersive and interactive users' experiences, sorry for the long list of buzzwords identifying the key characteristics. The "users" are subdivided in two families: creative/authors and citizens. The first family is again subdivided by: authors without cyber skills and the couple creatives/programmers. The outcomes of the project includes specific training courses to enable both authors to express their creativity thanks to a simple procedure and already developed components or in case of cyber skilled users to integrate the open source platform with new ad-hoc created components.

1. Setting the scene

After the extraordinary success of online communication technologies including, of course social media, it is foreseeable a potential coming cultural revolution due to immersive "communicative experience". It happened several times that technologies lie parked for years till they get on stage, think about the Internet, AI, RFID, Neural Networks, mobile phones, and more.

In 1989 the artist Monika Fleishman disclosed a cutting-edge technology, virtual reality, long time before explored by Ivan Sutherland[1] and Morton Helig[2]. This was the origin of the exploitation of both Artificial Reality (1975) and Virtual Reality - on one side Myron Kruger[3], on other side Jaron Lanier[4] and Thomas Zimmerman (1985). In 1978 Andrew Lippman developed the Aspen Movie Map, enabling virtual navigation along the streets of Aspen thanks to a sequence of pictures linked together. In 1991 Carolina Cruz-Neira, Daniel J. Sandin and Thomas A. DeFanti developed the "Cave automatic virtual environment" better known as CAVE a cube with retro projected surfaces enabling one explorer to accompany small groups to visit a virtual environment. In 1993 Infobyte, a VR company located in Rome, developed a set of interactive virtual reality applications mainly devoted to exploring the application field of cultural heritage, Basilica Superiore di Assisi was the first application followed by Nefertary's Tumb, Rome Colosseum, St. Peter Basilica, Raffaello's Rooms, etc. Almost all the virtual environment created by Infobyte

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[1] Ivan Sutherland - https://history-computer.com/ivan-sutherland-complete-biography/
[2] Morton Helig - https://www.historyofinformation.com/detail.php?id=2785
[3] Myron Kruger - https://aboutmyronkrueger.weebly.com/videoplace.html
[4] Jaron Lanier - http://www.jaronlanier.com

offered an enhanced degree of interaction allowing the user to virtually restore or switch from one scenario to a related one.

Interactive virtual reality applications were designed to be experienced by one user per time, even the cave allowed only one "explorer" even if accompanied by some visitors.

An interesting exploration of the potential field of application of IVR in education was devoted to particularly difficult scientific topic, the magnetic field, and its laws. Students had the chance to "enter" in this universe and observe the behaviour of an electrical particle thrown within a magnetic field having the additional option to tune all the key parameters and see the outcomes.

In the 1990s Virtual Reality was considered a potential pervasive technology offering benefits in different fields from human computer interaction to culture. On the other side the spectre of virtual drug and attempt to destroy social relation was many times evocated.

Many times, a limited application of VR was successful, typically interactive walkthrough in virtual scenarios, even if the potentialities of interactive virtual reality were incredibly wider using virtual sensors, virtual actuators, autonomous behaviours of digital objects, enhanced interaction among entities and more.

As it often happens interactive virtual reality succeeded in some fields and was considered not enough mature in others. Consequently, IVR reached the so-called "calm phase", and another potential pervasive technology came of stage the "World Wide Web".

Nowadays powerful devices are in the pockets or on the desktop of citizens, display devices ranging between cartoon[5] "googles" and affordable cost head mounted displays offer the opportunity to feel immersed in a virtual 3D scenario.

The concept of Metaverse[6] probably dates back in the 1990s when Bruce Dammer introduced the "Digi-gardener" the avatar of a gardener remote controlled by humans, more recently the movie Avatars outlined this idea to create digital "proxies" operating in a cyber universe. Some thirty years ago, we remember Habbo Hotel[7] social game, players can store assets as in a kind of digital Monopoly, even in this scenario thief use to act stealing virtual furniture and cloths. Then it was the time of Second Life (Linden Lab 2003), SAS Cube (SAS3 - Maurice Benayoun, David Nahon 2001), Street View (Google 2007). Oculus Rift (Palmer Luckey 2010), Facebook purchase Oculus VR, Project Morpheus (SONY 2014), Cardboard (Google 2015), Michael Naimark was appointed Google's first-ever 'resident artist' in their new VR division (2015), and lastly, till now, the Metaverse (META 2021)

1.1 Immersion, immersivity

We need to specify the meaning of "immersion", does it mean "emotionally involved", "blurring reality with virtuality"? There are different experiences that can be labelled "immersive", reading a book, watching a movie, attending a concert or opera, experiencing wild nature, spiritual experiences and more. The ability to feel "immersed" differs from person to person some people are unable to feel immersed even if they experience the most "immersive" situation, they still keep the two environments separated.

Digital technology till now has mainly acted as a human insolation technology, computer mediated human relations or even a "loneliness relation" with your terminal, a smart phone,

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[5] Cardboard (Google 2015) - https://arvr.google.com/cardboard/

[6] The science fiction novel Snow Crash (by Neal Stephenson) originated the term "metaverse" (1992) – https://en.wikipedia.org/wiki/Snow_Crash

[7] Sulake, 2000 - http://www.sulake.com

gaming console or laptop. It happens that friends sitting around a table at breakfast or lunch do not interact among them but watch their smartphones sending messages or browsing the web sites.

It is time to develop digital technology improving socialisation, taking citizens out from their apartments joining the variety of agora, public spaces in city squares, theatres, stadiums. After a long training in watching DVDs and video streaming, we know that there are some "shows" that must be enjoyed in group, football matches, scary movies, science fiction are better experienced together with other people.

The key assumption is that immersion needs to be triggered not only in a circumscribed space where visitors have to come but throughout the digital network between institutions and people using different platforms, not only within their own "bubble" but together, not only with dedicated equipment but also using capturing sensors for a minimally-invasive collective and social experience either in the public space or remotely to gather the citizens and to cope with potential confinement and distant cultural access. This immersion paradigm shift – in which passers-by, visitors, or internauts take part – will improve the institutional flexibility and cultural offering, stimulate cultural consumption, increase revenue, and enhance social impact. This will require arts and cultural institutions to establish corresponding business models and foster new cultural consumption patterns to meet the upcoming needs (remote 3D interaction,) of the public digital usage.

There are already, scattered around the world, several public spaces that are suitable for such cultural offer think, for instance, to airports and malls, people use to spend time in such facilities and why not enjoy some cultural experiences even related to local assets?

In the last decades citizens experienced different public space digital exhibits[8] such as Uffizi Virtual Experience[9], Van Gogh: The immersive experience[10], Galileo all'Inferno[11], or Virtual Zoo 7D[12] and more.

Advances in immersive technologies may represent competitive advantage to the media industry (e.g., eXtended Reality[13]) and are an important driver for the experience economy, enhancing breadth, depth and intensity of artistic performances or the visitors' experience at arts and cultural institutions.

Yet, advanced immersive solutions are usually neither readily available nor broadly accessible:
a) they require specific developments that can hardly be carried out by most institutions.
b) they are usually confined into a virtual or actual close space where conditions, either human or environmental, can be fully mastered;
c) they are usually limited to cinematic experience in which bystanders play little or no role;
d) the inherent affordance of immersive propositions, which sometimes rely on complex software interfaces and expensive equipment, is questioned by the currently evolving world health situation.

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[8] The Atelier des Lumières opened in 2018 in Paris - https://www.atelier-lumieres.com/
[9] Uffizi Virtual Texperience - https://www.youtube.com/watch?v=8pG4FLIEFBc
[10] Van Gogh: The immersive experience - https://www.youtube.com/watch?v=dZkQSjZYsgc
 https://www.youtube.com/watch?v=Lxmh5m8hm8g
[11] Galileo all'Inferno - https://www.youtube.com/watch?v=3ieZWM5-aK8 - https://www.youtube.com/watch?v=rxan29oMB_U
[12] Virtual Zoo 7D - https://www.youtube.com/watch?v=noDLH7XzN7Y
[13] Virtual reality (VR) in Europe https://www.statista.com/topics/3295/virtual-reality-vr-in-europe/

A relevant step forward can be due to the exploitation of large interactive virtual reality theatres in public spaces, where citizens can experience both media companies' products and creatives' artefacts. In such public spaces citizens can interact with the application even in connection with other citizens located in public spaces pertaining different countries and cultures. Some of early experiences in this field of remote cooperation among artists were experienced on the occasion of the Ars Electronica Festival[14] many years ago, or by Art+Com[15] and more recently on the occasion of the pandemic especially in the field of music and performing arts in general.

There is a need to create a global framework for Cultural Creativity, by designing and developing efficient, cost-effective software and hardware (projectors, computers, cameras, and detectors), multi-user, multi-site, multi-platform non-invasive immersive and interactive users' experiences, sorry for the long list of buzzwords identifying the key characteristics. Both software and hardware need to be optimised to offer users a hassle-free, less costly sustainable and enhanced immersive experience to favour the approach to culture as an emotionally engaging "communicative experience" in public spaces[16].

This is exactly the aim of the project "Artcast4D: unleashing creativity", a 36-month project coordinated by Politecnico di Milano and developed by ten domain-skilled partners[17] from seven European Countries, merging research, technological, creative, and cultural background. In 2022 the project "Artcast4D: unleashing creativity" has been awarded by the European Commission in the framework of Horizon Europe Cultural Creative Industries[18].

Concurrently following academic and industrial approaches, it relies on theoretical and experimental research, open-source software, and hardware development together with challenging case studies and onsite beta testing implementations[19]. To ensure both easy maintenance and wider impact, such applications / SDK will also have an easy customisation interface, allowing for the development of extension modules.

1.2 Key challenges

All the above already represent an ambitious goal, but there are several challenges to be considered; first, the all-in-one immersive solution should be easy to install and calibrate, work indoors and even outdoors[20]; it should be non-invasive, avoid information distraction and overload, and finally, support and blend with the networked social activities.

These platforms must be ready to be used both by creatives without specific cyber knowledge or to be enhanced by developers and augmented by third parties' contributions.

To better tune the solution with on the field implementations some pilots will showcase the potential of immersive experiences to boost creativity as a driver of innovation and competitiveness using impact assessment and measurement techniques. Furthermore, pilots will provide evidence on the role of the cultural and creative actors as drivers of innovation in other economic sectors such as citizen's engagement, art & creativity, innovation in art

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[14] Ars Electronica - https://ars.electronica.art/news/en/

[15] Art+Com - https://artcom.de

[16] One of the early examples was the reengineered version of immersive experiences in Disney Quest (Orlando) the first theme park adopting IVR. The shift from lab versions to mass use imposed relevant changes even due to the sanitization of devices.

[17] Politecnico Di Milano (IT), Exus (GR), Md Lite (FR), The Battleground (BE), Universite Paris-Sanclay (FE), CERTH (GR), Culturalink (SP), Societe D'economie Mixte Issy-Media (FR), Watermans* (UK) IFAAR* (CH) – (*) Since Switzerland is currently a Third Country, IFAAR can no longer participate as a Beneficiary and is now an Associated Partner.

[18] Artcast4D has been funded by under Grant Agreement 101061163

[19] Citizens Engagement (Issy-les-Moulineaux, France, Art in Public Spaces (Hounslow, UK), Innovation in Art and Experience (Valencia, Spain), Wisdom Tourism (Athens, Greece)

[20] The standard equipment works in dim light, but there is a full daylight option.

and experience, and why not tourism and advertising of cultural events like a global social sculpture. Minorities can take full advantage from these technologies to express their own culture and history thanks to this technology that will enable participants to feel immersed in the specific environment. The aim of this project is to fulfil the scope of creating an opensource environment that enabled network connected public spaces immersivity with limited use of wearable devices. The key objectives of the project are described in the following paragraph.

2. Objectives

The interactive immersive production field is heterogeneous and made up of several organisations, companies and independents that work with a variety of software and hardware solutions, for the most part in museums and curatorial cultural contexts[21]. Works are often exhibited for a restricted audience in confined spaces or systems. In the last few years there has been a significant increase of the demand for bringing interactive immersive works into public spaces. This trend is especially strong in Europe, where the demand by cities, of medium and small sizes, for projection-mapping and digital street art events is constantly growing. However, large-scale multi-user interactivity is still in its infancy with a clear technological bottleneck. As it was already outlined in the 1990s and later by the increasing interests in the field of digital preservation[22], we must carefully consider preservation of digital artefacts[23] and performances together with their developments. One of the key aspects is the preservation of intangible heritage especially when it is related to performing arts and rituals, immersive virtual reality theatres may help in doing this. Standardisation and open-source code planned in Artcast4D will help.

Objective 1: is to produce a global framework for European Cultural Creative Industries for designing and developing efficient, cost-effective, multi-site, multi-platform non-invasive immersive and interactive users' experiences designed as global social sculptures.

Objective 2: aim at providing advanced understanding and global business solutions on Artcast4D setups to enhance both bottom-line performance and social impact of small and medium-sized cultural heritage sites and arts centres. Thanks to the high versatility and the easy tuning of the envisioned platform, a time-sharing approach enabling multiple communication experiences within a day will be promoted (e.g., with educational contents in the morning, scientific or cultural grounds in the afternoon, artistic propositions at night).

Objective 3: to set a reference open innovation environment with a robust commercialisation plan that largely supports the adoption, deployment, and upscaling of immersive and interactive technologies by the creative communities throughout Europe.

Objective 4: to promote the implementation of the technology technically and financially outside the cultural institutions – in the heart of the city or in more remote places – for educational, informational, entertaining, or marketing purposes, bringing together creative actors and industrial partners with civil society and public stakeholders.

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[21] McErlean K. Interactive Narratives and Transmedia Storytelling: Creating Immersive Stories Across New Media Platforms. Routledge; 2018. doi:10.4324/9781315637570

[22] Digital preservation EU https://digital-strategy.ec.europa.eu/en/news/european-competence-centre-digital-preservation-and-conservation-cultural-heritage-and-projects

[23] Digital Preservation round table in New York in 2004 and research carried you by Ars Electronica, Linz (A)

3. Methodology

The most radical integration of methodologies Artcast4D initiates is to promote the interactivity of cultural displays. Cultures of the past are typically 'passively observed', in museum exhibits and similar displays, where 'interaction' remains optional, and is always inhibited to the spectator. In Artcast4D by contrast, culture 'jumps' onto the audience, and invites them to 'participate' in it, as a live creation of the heritage of that culture. In the past decade, the most advanced museum innovations were to 'augment' the presentation of the culture on display, visually or informationally, mostly with dedicated single-user approaches. Recently some META[24] advertisements proposed the live interaction with ancient Romans or the ability to explore the Persian markets at the time of Kurus, these were the dreams of the initial age of virtual reality in the 1990s. Artcast4D is attempting something different offering a full set of powerful innovative tools to cultural operators. Citizens will collectively 'embody' aspects of the culture on display, and react to it, as a whole. This goes beyond physical interactivity, into the cultural dimension, which is the point where interdisciplinarity is imperative for the successful development of the project. When an exhibit is physically interactive, the exhibited theme needs to be interactive too, to match the boldness of the exhibit. The project team therefore designed the collaboration of 'architects of physical interactivity' with 'architects of conceptual interactivity' to generate an integrated cultural experience, a "communicative experience". Furthermore, immersion has always been conceived, almost tautologically, in closed spaces. It is time to broaden its use and to bring it to the public in free spaces. The research project relies on the in-depth study of the key features of immersion and of a cutting-edge 3D open-source solution with supporting all-in-one devices. The methodology can be summarised in five steps:

1. Explore the potential of immersive technologies. Through an original comparative study, the project team aims at specifying the key features that promote immersion on the available platforms with respect to curiosity, empathy, engagement, interaction, collaboration, emotion, and understanding. The outcomes will be assessed in the light of the recorded behavioural actimetry to determine a metric of the users' immersion. Through desk studies, the team intend to collect the actual needs of the EU CCIs in terms of immersive technologies and undertake business and technical feasibility analysis.

2. Develop a new immersion framework. Based on the cumulative long-term expertise of the partners in the field, the team will design and develop affordable equipment and a full open-source software solution to produce cost-effective, flexible, multi-site, multi-platform non-invasive immersive and interactive environments with ease to install, calibrate, maintain, and update.

3. Challenge and deploy the new technology. Project' partners will implement the new technological solution at four sites with radically different situations and immersive environments in terms of attendees, public spaces, types, contents, and functions. These four pilot cases will be connected to test the feasibility, validity, reliability, and sustainability of the multi-site solution through a KPI-oriented evaluation and monitoring process along the defined metric of the users' immersion.

4. Train developers, creative and cultural actors. The team will design open training modules for cultural and creative professionals to strengthen immersive technology knowledge and skills. Artcast4D will facilitate the better use of the immersive experience and business solutions in their artistic creation and cultural management practices. The modules will address artists, beginners, and senior developers to facilitate and maximize the transfer and spread of the solution. Artists and beginners will fully take advantage from the easy management of the "authoring" procedures, senior developers will connect with the open source Artcast4D platform their ad-hoc created customisation modules.

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[24] META Platforms Inc.

5. Establish business solutions and policy recommendations. Partners will provide the keys for the adoption and use of the immersive technologies in the target organizations in public administrations as well as on the user side. Team's experts will deliver business solutions with corresponding promotion models for creative and cultural industries as well as other industries and services. Partners will translate the project research and development outcomes into policy briefs about how to strengthen the competitiveness and innovation potential of CCIs on national levels, in the EU and on the international markets.

4. Technology Description

The starting point of the present project is the long-term experience accumulated by the on the shelf immersive software: AAASeed. Accordingly, with the outcomes of our GAP Analysis, Artcast4D ambition is to:

A.   Develop an open-source reference software. In the line of AAASeed, the developed platform will be based on a fast access interface with embedded modularity and scalability together with evolving hardware components and appliances. Such technical specifications will ensure the opportunity to transfer to future generation digital artefacts and performances.

B.   Offer an all-in-one solution. The platform is designed to provide an all-in-one software and hardware kit that includes innovative projections systems and control units. Yet, it will not be restricted to it, but it will rather pave the way to an open standard suitable to be integrated and extended by third parties.

C.   Ensure easy sensor setup and their integration in the open space (i.e., what kind of cameras will be needed in terms of resolution and capturing capacity (for example RGB or RGB-D), how many cameras and where they should be placed in the open space with tangible VR calibration of the overall setup).

D.   Enable multi-user interaction in large open immersive spaces[25]. Artcast4D integrated platform specifications allow the easy installation of the solution in large open immersive environments suitable for multi-user concurrent interaction even in online remote mode[26].

E   Standardise an interaction and immersion vocabulary that will tell which interactions may be relevant (e.g., perceived, felt, or understood) and which conditions may trigger immersion (e.g., visual, sound, olfactory, tactile, or informational cues). Quantitative and qualitative markers will be prospected and challenged through real-time computer vision algorithms. These last aspects involve the use of some AI and ML to inoculate some smartness in the system.

5. Developments

Thanks to the direct genesis from a long term developed and continuously improved solution (AAASeed and D-Lamp) Artcast4D even if it appears as an ambitious project is well located between the idea and the application as well as from laboratory and market. Thanks to the solid starting point and the open and scalable architecture the different levels of immersive interaction can be implemented step by step and extended step by step with specific reference to the "interaction vocabulary" and high-performance modules open to customised extensions created by users.

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[25] https://heartbeat.comet.ml/creating-a-dancing-avatar-with-3d-body-tracking-in-lens-studio-da3d5163109 // D. Mehta; O. Sotnychenko; F. Mueller; W. Xu; M. Elgharib; P. Fua; H.P. Seidel; H. Rhodin; G. Pons-Moll; C. Theobalt: XNect: Real-time Multi-person 3D Motion Capture with a Single RGB Camera, ACM Transactions on Graphics (Proc. SIGGRAPH), 2020

[26] Some early examples of remote immersive interaction have been tested at Ars Electronica, MIT, and ART+COM with positive feedback.

6. Results

The Artcast4D project initially focus on the exploration of the potential of immersive technologies through an original comparative study, through desk research, and will result in the collection of the actual needs of the EU CCIs regarding. the immersive technologies to further undertake both business and technical feasibility analysis. Through the development of a new immersion framework, the design will focus on the development of affordable equipment and a full open-source software solution necessary to produce cost-effective, flexible, multi-site, multi-platform non-invasive immersive and interactive environments. After the initial design and development, partners will work on the multi-user interaction techniques in open immersive spaces through Computer Vision, 3D body tracking methods and conversational AI bot. The outcomes of the development of a new immersive framework will be integrated to propose easy installation, calibration, maintenance, and update of the Artcast4D solution. Guidelines will be established for basic interactive immersive installations, engaging all pilot partners. In the implementation of the different pilots, the new technological solution will be deployed and validated in four different immersive environments (Issy-les-Moulineaux, Hounslow, Valencia, and Athens) in terms of public spaces, types, contents, and functions, located in four different countries. Based on the analysis of the pilots' results, appropriate business model(s) and requirements for entry into market and the outcomes of the project research and development will be translated into policy briefs about how to strengthen the competitiveness and innovation potential of CCIs on national levels, in the EU and on the international markets.

7. Business Benefits

Artcast4D Exploitation and Sustainability strategy defines the objectives foreseen in the proposed exploitation activities and implements a regularly updated plan to meet its objectives, drive Artcast4D solution take-up and actions that will lead to a successful business model and plan that will be early produced and regularly updated during the project's lifetime, growing Artcast4D affiliates network and set the sustainable foundations for Artcast4D to become sustainable and profitable beyond the project's funding. The Exploitation strategy and plan will be coordinated in conjunction with Artcast4D dissemination & communication activities and be supported by the latter in creating and implementing engaging exploitation activities to reach its commercialisation objectives beyond the project's lifetime.

Artcast4D will prioritise the exploitation of the project's outcomes that will generate sustainability beyond the project's end:

1) Technological outputs: i.e., empowered AAASeed real time 2D/3D software associated with D-Lamp hardware solution. The empowered AAASeed platform by going full open source will ensure a large and lasting user base and visibility as a result of the Artcast4D project. The key to commercial success is the association of free software with an original hardware solution.
2) Training modules for marketing and training purposes.
3) Pilot use cases that will have reached a close-to-market state following continuous pilot testing and evaluation in real life settings by project's end.
4) Artcast4D affiliates network and its small size demonstrators.
5) Individual partners exploitation of the components.

The empowered AAASeed platform: Key to its commercial success will be teaming open-source software with an original cost-effective hardware solution. This "package" will primarily target cities and small and medium sized cultural actors. Interactive projections and large format displays in open and public spaces is an always expanding market, where

SMEs, Agencies and CCIs professionals are finding new business venues to provide content and services. Artcast4D, by entering such a large market will serve as a catalyst to reach out to a new and promising market beyond project's end. Exploitation activities as setting up "Small scale demonstrators" combining Artcast4D training modules and engaging end users will be used as a roadmap for future distribution and marketing activities. A key objective of these activities will be to grow a lasting Affiliates Network composed of SMEs adopting Artcast4D solution and to customise it to their needs and specific customers' requirements. The "package" refers to the open-source aspect of the core software. The software will have a life of its own and be used by a variety of diverse users. The software, one of the most powerful real-time 2/D 3/D software solutions around, will have a unique positioning in this ever-growing market, where all competing solutions are commercial ones. Artcast4D software will be distributed free of charge software under a GNU/GPL license, including all user guides and tutorials. The project will carry out an extensive research study on the evolving open-source models, such as the MIT, BSD, EUPL, etc... Licensing solutions. This "model" is based on the Blender 3D animation software. The "Blender 3D animation software" European success story is an example for Artcast4D to follow. According to its 2020 annual report, the Blender foundation generated 1.3 million € in revenues out of donations from corporate and users. In 2020, over 12 million downloads and some 3 million estimated users worldwide. It took over a decade for Blender 3D to reach success. AAASeed and Artcast4D are aspiring to such a success by 2035: AAAseed aims to reach 300000 active users worldwide.

The Artcast4D project is providing a unique opportunity to help define future features and confronts these assumptions in real life environments (pilots). The 3 main goals of Artcast4D exploitation strategy and plan include:

a) the maximisation of revenues from commercializing the aforementioned tangible and measurable outcomes and components,

b) the sustainability of the developed open-source business model that will be explored in the project,

c) the maximisation of the exploitation activities in growing Artcast4D Affiliates network and its small size demonstrators.

In addition, the individual exploitation plans will enable the consortium partners to realise the full exploitation potential of the project in a flexible way, making sure that no conflicts occur.

8. Conclusions

We can split the conclusion in two main sections, on one side immersive installations in open public spaces can reverse the cyber trend toward the encapsulation of citizens in cyber bubbles, increasing the insolation and the loneliness. The emerging concept of metaverse, if misinterpreted, can elicit the will to live in a meta universe increasing the distance from reality, some more citizens wearing headphones concentrated on the smart phone screen or desktop console. The concept beyond the project is to reopen the cyber domain to public spaces, social interaction, and dialogue.

On the technological side the project aims to reconnect and further develop the concept of virtuality identified by the pioneers in this sector and hibernated mainly due to the technological context of that time. That time virtuality was available to a limited number of citizens, enjoyable by single users, incredibly expensive. Nowadays powerful technology is cheaper and already in the pocket or on the tabletop of citizens, the digital communication infrastructure offers enough bandwidth and looks for killer applications. The pandemic accelerated the transition to digital and citizens explored remote working and interaction. So why not re-enable social interaction thanks to immersive multiple users' environments.

Content Technologies including Languages; Digital Preservation

There is a key concept that guides this project: keep humans and social aspects in the technology loop.

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