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Research for CULT Committee - The Use of Artificial Intelligence in the Cultural and Creative Sectors

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BRIEFING

European Parliament

Research for CULT Committee - The Use of Artificial Intelligence in the Cultural and Creative Sectors

Concomitant expertise for INI report

KEY FINDINGS

In this introductory briefing, we report six key findings on the use of Artificial Intelligence (AI) in the cultural and creative sectors (CCS).

Finding 1: AI challenges the creative value-chain in two ways: shifting services performed by humans to algorithms and empowering the individual creator.

Finding 2: AI-generated content challenges authorship, ownership and copyright infringement. New exclusive rights on datasets must be designed in order to better incentivise innovation and research.

Finding 3: European cultural institutions have rich datasets of cultural artefacts that could be made accessible to a larger audience. AI has the potential to create rich ways for users to navigate through cultural content. Good practices in AI for cultural heritage accessibility need to be formalised and shared among the European cultural networks.

Finding 4: The use of AI for media content brings up issues regarding cultural and linguistic diversity. Public policies and measures are required to prevent discrimination in AI-based distribution platforms.

Finding 5: AI governance is centralised, which has an impact in the CCS. Funding instruments are needed to support less-centralised, human-centred AI.

Finding 6: The Union supports a rich environment for AI-Art, resulting in the development of critical discourse on technology and AI by the public, which should be sustained in the long run.

EN

Introduction

In an increasingly digitised world, the quantity and heterogeneity of data grow exponentially. Data capture Internet browsing activity, money transfers, energy consumption, health diagnostics, media creation and consumption, to name a few. AI designates the set of machine learning tools that are able to crunch this massive quantity of data, extract underlying patterns, and make predictions of future events and behaviours. The capacity of these tools made a significant step forward in 2012 when deep learning based algorithms reached human-like abilities in image recognition tasks. Since then, AI has spread at a tremendous pace across research disciplines, solving several problems such as speech recognition, and then evolving from academic research to consumer services used by billions of people.

In this context, AI is often erroneously considered neutral as it appears to be no more than a set of sophisticated optimisation mechanisms used to achieve a task, e.g. classifying images, generating sounds or texts, with the best performance. However, AI builds on data that capture socio-cultural expressions represented by music, videos, images, text, and social interactions, and then makes predictions based on these profoundly non-neutral and context-specific data.

Culture therefore plays a central role in the use of AI at scale. Culture needs to be addressed in the general discourse and public policies about AI, and this has not systematically been the case so far. The CCS are not among the priorities of numerous recent white papers and reports presenting policy options and recommendations on AI in society[1]. In the white paper published in February 2020 by the European Commission "On Artificial Intelligence – A European approach to excellence and trust", the Commission supports the development of human-centric AI[2]. A human-centric perspective on AI should embrace cultural diversity and should support human creativity, critical discourses, and artistic idiosyncrasies.

The objective of this introductory briefing is to examine the role and impact of AI in the CCS, by reporting on AI use-cases in the CCS. The methodology used in this report consists of interviews with actors in the field[3]. We, then, conducted desk research on published reports and white papers relevant to the topic written by several stakeholders: the European Commission[2], UNESCO[1], and a report on AI in the Media and Creative Industries[4]. Finally, we completed the survey with articles from digital humanities and AI, and selected media coverage from the past five years.

AI in the creative value-chain

Recent reports[4] have shown that AI has entered the creative value-chain at every level: **creation**, **production**, **dissemination**, and **consumption**. AI can automate tasks within this pipeline that were thought only feasible by humans not long ago. Research on certain tasks is mature. Examples include image discrimination and generation as well as audio source separation and mastering[5]. In addition, AI use-cases within this pipeline have direct market applications and have created incentives for the private sectors to embed this technology into their products and services.

Creation has been facilitated by advances in algorithmic generation of new media content with impressive quality (see more specific details in Appendix). AI-based generative models are applied to music, text, images, or videos. A driving force behind the development of content generation is

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to help automate time-consuming uncreative tasks that may sidetrack creators from their main task, which consequently increases costs. **Automated journalism** is an example and consists in automatically collecting data feeds from online content providers and populating templates, which are usually made by human journalists, with these data. Automatic journalism is primarily applied to routine stories, such as sports reports. Automatic journalism is already widely used, but different strategies can be observed throughout Europe. In Finland, the majority of media outlets have preferred in-house development of technology responsible for automatic generation of content, by investing in human resources[6]. In the UK, the BBC uses an external platform where journalists can configure, to some extent, the generated reports[7]. In France, *Le Monde* or *France Bleu* have chosen to completely out-source the process to an external company called Syllabs[8]. Using out-sourced solutions is understandable but can raise questions when content generation algorithms are used to write more complex and less supervised reports. Reuters just released a prototype that creates sports reports generated directly from video content, without human supervision[9]. How can **quality assessment** be implemented? What is the level of human control on such generated content? Will human intervention eventually no longer be required for automated content generation? The frontier between AI used to *assist* or AI used to *replace* content creators is fuzzy. Certain players are positioning themselves explicitly. Antescofo, a Paris-based start-up, proposes a tool for automatic accompaniment in classical music[10], which does not intend to replace orchestras but rather simulates them in pedagogical or rehearsal scenarios.

Reducing costs through automation also appears throughout the audiovisual production chain, raising important questions. For example, music mastering usually occurs in professional studios and can be expensive for artists that are not yet established[11]. AI-based tools can help these artists create high-quality musical productions that they can then use to approach labels. Europe is attractive for **AI-driven audio engineering** with hotspots in Berlin (Landr), Barcelona (Dolby labs) and Paris (Spotify France). We also found similar solutions in the movie sector, such as automated editing, although most of the companies proposing these services are located outside Europe. Here, disrupting the creative value-chain means that algorithms **internalise** steps that were previously handled by experts. Editing, producing, and mastering are tasks requiring specific skills and equipment, such as, for instance, a professional music studio. Automation in the creative process can therefore reduce dependency on external expertise, providing creatives and artists with "**low entry fee**" tools. However, in doing so, it can collaterally damage expertise that was initially needed to create the datasets from which AI-based systems were built. The impact of this disruption on Cultural and Creative Industries (CCI) is unclear. To what extent will the algorithms performing expert tasks incentivise research and innovation? What is the expected deskilling within the creative value-chain? A recent report by the World Economic Forum (WEF) forecasts a growing number of jobs in CCI[12], facilitated by increased access to technology. On the other hand, calling upon expert skills within the creative process may remain the preferable choice for bespoke demands.

[5]   https://yle.fi/uutiset/osasto/news/yle_releases_code_for_robot_journalist_voitto/10126261
[7]   https://bbcnewslabs.co.uk/news/2019/salco-ge/
[8]   Danzon-Chambaud (2020) https://larevuedesmedias.ina.fr/journalisme-automatise-robot-media
[9]   https://www.forbes.com/sites/simonchandler/2020/02/07/reuters-uses-ai-to-prototype-first-ever-automated-video-reports/#312591bb7a2a
[10]   https://www.antescofo.com
[11]   https://www.theverge.com/2019/1/30/18201163/ai-mastering-engineers-algorithm-replace-human-music-production
[12]   WEF (2018). Creative Disruption. http://www3.weforum.org/docs/39655_CREATIVE-DISRUPTION.pdf

Conclusions

Disruption in the creative value-chain operates in two different ways:
- Shifting services usually performed by humans to AI-based algorithms, raising issues in control and quality assessment of the AI-generated content.
- Bypassing external expertise to empower the creator, opening questions about the expected changes in incentives for research and innovation, and deskilling.

AI and copyright

In a time when AI is used to generate content, new questions also arise with respect to rightsholding. On the one hand, copyrights for AI-generated **outputs** (music, images, videos) put into question the existing notion of **authorship**. This has been illustrated in recent projects using AI-powered algorithms to generate paintings. *The Next Rembrandt* project[13] produced a painting generated from Rembrandt's body of works. The impressive result is a speculation about what could have been Rembrandt's next painting. Similarly, the *Portrait of Edmond Belamy* is a painting created by an algorithm called *Generative Adversarial Network* (GAN, see appendix). The artist's signature is the equation identifying GAN-like algorithms. Is the author of the painting the AI-powered algorithm, the team(s) putting together the system, or the author of the original paintings which were used as a training dataset?

If the author of an AI-generated work cannot be legally identified, the work may not be protected by copyright. In the UK, the Copyright, Designs and Patent Act defines the author of a work as follows: "In the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken"[14]. In Germany, however, "only the author's own intellectual creations constitute works within the meaning of this Act"[15], therefore AI works cannot be protected. Alternatively, may the system be identified as the author? Under the current legal framework, an AI-based system may not be considered as an author[16]. However, recent innovations challenge this state of affairs. One example is AIVA, a start-up company and the name of a music-generating AI-based system that the company developed, which has recently been given the status of composer by the SACEM, France's authors' rights society[17]. Then, depending on the type of subscription, an AIVA user can own the copyright of the work generated with AIVA.

The question of **ownership** must also be addressed. Does an AI-generated output belong to the person who designed the dataset used to train the system, the person who trained the system, or the person who built and implemented the system? Ownership attribution depends on stakeholders (human creators, technology or data providers). As an example, the Google Arts & Culture in Paris proposes art residencies where artists use the company's AI technology in their projects. Artists are assisted by Google engineers, or freelance artists contracted by the company, to help them handle the technology. After the residency period, technological outcomes (algorithms, applications, or user interfaces) are owned by Google, while the created works (images, videos, or music pieces) are owned by the artists in residency. In this context, AI-based systems are seen as tools, regardless of level of human involvement. Another example can be taken in the music industry. Endel, a Berlin-based start-up company and the name of an app that generates personalised soundscapes to enhance focus or encourage relaxation, is the first AI-

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[13]   https://www.nextrembrandt.com/
[14]   http://www.legislation.gov.uk/ukpga/1988/48/section/9
[15]   https://www.gesetze-im-internet.de/englisch_urhg/englisch_urhg.html#p0018
[16]   Frosio (2019) Artificial Intelligence and IP - Mapping Legal Challenges for the European Digital Single Market. http://www.iprhelpdesk.eu/sites/default/files/newsdocuments/AI%20and%20Legal%20Challenges%20in%20the%20DSM%20%20%28EU%202019%29.pdf
[17]   https://aibusiness.com/aiva-is-the-first-ai-to-officially-be-recognised-as-a-composer/

based system signing a major label distribution deal with Warner Music Group[18]. Warner is not in control of Endel's algorithm, but shares half of the royalties with the company[19].

AI-generated creative content also raises new questions regarding **copyright infringement**, which "is the use of works protected by copyright law without permission for a usage where such permission is required"[20]. As pointed out in Frosio (2019), deepfakes, artificially generated media in which a person's likeness in a video or image is replaced by someone else's, challenge the current legal framework. The notion of copyright infringement is also discussed in the music industry[21]. An AI-based system could be trained on an artist's music tracks so as to be able to generate new tracks that resemble that artist's music. Would it be a case for copyright infringement? The question is fraught. The way an AI-based system uses training data to generate content is neither copy-pasting nor sampling[22]. These systems involve learning mechanisms that could provide the machine with creative skills (as commented about AlphaGo[23]). Consequently, it becomes difficult to prove that an algorithm was designed to copy an artist, as well as that an algorithm was trained on an artist's music it infringes on.

These examples put into question the notion of originality. If someone in a video is replaced by someone else's likeness, is the new work original? If an algorithm generates a music track that resembles an existing artist's music, is the AI-generated work original? This is an open question directly stemming from recent advances in AI and their applications to the CCS. Since most AI-based systems involve training procedures relying on fixed datasets, it is not obvious to what extent the generated content can be construed as original with respect to these datasets. These questions still need to be addressed in legal terms. In that regard, the EU regulation for AI-generated content is at its infancy[24], and last year the Commission issued a literature review on Intellectual Property and AI[25].

On the other hand, copyrights for the **inputs** of those algorithms pose a very important, although less addressed, challenge[26]. AI algorithms are based on machine learning techniques that require processing datasets for classification, recommendation, or generation, but these datasets are often proprietary. What type of **Intellectual Property (IP) rights** for data would allow machine learning and data mining?

There is an ongoing discussion in Europe about how copyrighted content, sound and movie catalogues for instance, can be used by non-profit and for-profit stakeholders in order to enable research and foster innovation. Should data be protected with **new exclusive IP rights**? Currently, Union law allows fewer exceptions on copyrighted content than laws in the USA, China, or Australia[27]. It has recently evolved towards exceptions for *non-profit* purposes, meaning that research centres and universities can apply data mining techniques i.e. the crunching of massive datasets of music, videos, or images to look for patterns, on copyrighted content[28], with the aim to incentivise research and innovation. However, stakeholders argue that there is still a need to allow *for-profit* stakeholders to have access to proprietary datasets in order to efficiently foster innovation[29]. The music industry is a telling example. In a 2016 article[30], an investor in the music

[18]   https://consequenceofsound.net/2019/03/endel-alogrithm-major-label-deal/
[19]   https://www.theverge.com/2019/3/27/18283084/warner-music-algorithm-signed-ambient-music-endel
[20]   https://en.wikipedia.org/wiki/Copyright_infringement
[21]   https://www.theverge.com/2019/4/17/18299563/ai-algorithm-music-law-copyright-human
[22]   https://scholarlykitchen.sspnet.org/2020/02/12/if-my-ai-wrote-this-post-could-i-own-the-copyright/
[23]   https://www.wired.com/2016/03/sadness-beauty-watching-googles-ai-play-go/
[24]   https://cms.law/en/rou/insight/artificial-intelligence/ai-created-works-creative-original-or-just-sweat-of-the-brow
[25]

       https://publications.jrc.ec.europa.eu/repository/bitstream/JRC119102/intellectual_property_and_artificial_intellig
       ence_jrc_template_final.pdf
[26]   https://musically.com/2019/11/27/legal-issues-training-musical-ais/
[27]   http://eare.eu/assets/uploads/2018/06/Global-AI-Race.pdf
[28]   https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3452376
[29]   https://cms.law/en/gbr/publication/ai-and-data-mining-questions-of-copyright

industry counted the number of music companies that have succeeded in achieving venture returns for their investors. The success rate was about 4%. The author wrote that this "is a direct result of the high royalty rates incumbent upon startups who wish to license digital music for use in their apps". This observation is all the more relevant today, when the majority of newly created music start-up companies involve AI, for which the necessary datasets have expensive licences, or require to negotiate specific agreements.

Conclusions
- AI-generated content challenges authorship, ownership and copyright infringement. A central question concerns the notion of originality.
- New exclusive rights on datasets must be designed in order to better incentivise innovation and research.

AI for culture accessibility and discoverability

Europe is rich in cultural diversity, highlighted by its artworks, artefacts, music, languages, books, and movies. The practice of archiving and documenting helps preserve and transmit **cultural heritage**. We started our investigation with archiving initiatives which may not use AI techniques, but whose work can be seen as building the datasets for future AI-based projects. Europeana is an initiative that allows users to explore European cultural heritage through online browsing of more than 58 millions artefacts, artworks, etc[31]. Similarly, the 'Time Machine' project led by Frédéric Kaplan is an ambitious research project that gathers 2000 years of European history and is a step forward in making European cultural heritage available to a large audience of stakeholders. Archiving becomes critical in the case of intangible cultural practices such as dance. Motion Bank, a four-year project by the Forsythe Company (Dresden, Germany), aims at archiving and annotating the company's dance material from the company[32]. How can AI facilitate the accessibility of such cultural content? How can AI promote cultural diversity by allowing people to discover a wide variety of content? Implementing AI systems to improve the accessibility of cultural content are not yet common - the initiatives are scarce. Several challenges lie ahead. How does one design the interaction between a large public and AI-mediated content? How does one engage people in a rich, rewarding, and pedagogical experience? These are open questions that research has started to address, and guidelines for designing **human-AI interaction** have started to emerge, although they are not specific to the CCS[33].

Among the few examples is choreographer Wayne McGregor's recent collaboration with Google Arts & Culture in Paris to analyse and archive 20 years of video footage[34]. Analysing and processing this quantity of data required task-specific deep learning models and computational resources to train these models. The result is a large and browsable movement database. Another example of AI used to improve accessibility in the CCS is the Anne Frank House in Amsterdam, which has developed a chatbot, a messenger-like app with which visitors can interact in order to have instantaneous and personalised answers to visitors' questions about the museum[35]. Also in the Netherlands, the Van AbbeMuseum proposes remote visits through a robot equipped with a

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[30] https://pakman.com/the-music-industry-buried-more-than-150-startups-now-they-are-left-to-dance-with-the-giants-ecfd0b20243e
[31] https://demo.europeana.eu/en
[32] http://motionbank.org/
[33] Amershi, S. et al. (2019). Guidelines for Human-AI Interaction. In *Proceedings of CHI 2019* (pp. 1-13).
[34] https://experiments.withgoogle.com/living-archive-wayne-mcgregor
[35] https://www.annefrank.org/en/about-us/news-and-press/news/2017/3/21/anne-frank-house-launches-bot-messenger/

camera and a screen[36]. A similar initiative has been experimented in France to visit the Chateau d'Oiron[37].

AI has been introduced in these projects to improve **people's experience** and has the potential to provide, for instance, new types of search functionalities and interactions with content, through words, text, images, or sounds, fostering accessibility and discoverability[38].

Generally, more coordinated actions would be beneficial in order to share practices and resources in the CCS, as has been suggested by UK and US museums[39]. This work provides a toolkit for them to question the use of AI in their specific and unique context. Despite the great technological capacities of AI, cultural institutions have to be clear about what AI can or cannot do, where AI can be applied, how quality assessment can be done, and what resources will have to be allocated to its integration. The toolkit identifies considerations to take into account in deciding to use AI in a museum. These include ease of implementation, such as whether "off-the-shelf" AI tools that can be used for free (or at an affordable price) exist[40], the risk of brandwashing that arises from the affiliation of a museum with a tech company, and the management of bias, which is inherent to AI tools. This discussion could be brought to European museums and other cultural institutions in order to bring their collections closer to the general public, in an adapted and personalised way. This can be done through workshops, exhibitions, and research residencies.

Conclusions
- European cultural institutions have rich datasets of cultural artefacts that could be made accessible to a larger audience.
- AI has the potential to create rich ways for user to navigate through cultural content.
- Good practices in AI for the accessibility of cultural content need to be formalised and shared among the European cultural networks.

AI and cultural and linguistic diversity

Europe as a continent has 37 official languages. Supporting **cultural and linguistic diversity** by making media content **cross-language** is fundamental. The Embeddia project, funded under the research and innovation programme Horizon 2020, aims at employing AI to facilitate access to local news and government services to people by adapting the language[41]. The project includes academic and industry partners, and relies on deep learning technology to adapt content to any European language, in particular the under-represented ones. This is an example of active research that facilitates cultural and linguistic diversity as well as inclusion. This research also has economic interests as automatic language adaptation reduces costs and widens commercialisation. One of the major players in this field is the Ericsson Group and its subsidiary Red Bee Media.

Regarding media accessibility, images, music, videos, and news are typically distributed through centralised platforms: Spotify, Netflix, Google, Amazon, or Apple. Such **centralised access** to media content conditions media consumption to the proprietary algorithms developed by these platforms. How to ensure that, for instance, a local artist can be discovered on these platforms in the same way as an established artist? The criteria used to select or recommend a music piece, a movie, or images through text-based queries are **neither transparent nor auditable**, and are likely to be decided on the basis of economic factors that benefit the platform. Such algorithm-

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[36]   https://vanabbemuseum.nl/en/mediation/inclusion/museum-visit-with-robot/
[37]   http://www.club-innovation-culture.fr/un-robot-camera-permet-aux-visiteurs-a-mobilite-reduite-dexplorer-le-chateau-doiron/
[38]   Gillies at al. 2016 Human-centred machine learning. *ACM CHI* https://dl.acm.org/doi/10.1145/2851581.2856492
[39]   https://themuseumsai.network/toolkit/
[40]   Examples are: IBM Watson, Google Vision API, Microsoft Azure
[41]   http://embeddia.eu/

based filtering of media content is detrimental to cultural and linguistic diversity. Local artists or under-represented cultural and creative content are unlikely to appear in suggestions provided by these systems if these artists' works or performances are insufficiently profitable. The question of cultural and linguistic diversity in recommendation systems is central in academic and public policy debates[42]. Helberger (2018) raises the following questions: How does one define **exposure diversity** in order to identify design principles and policy objectives? How does one incentivise the platforms, such as Spotify, Netflix, Google, Amazon, or Apple, to recognise the value of diverse content, beyond providing the users with content they seem to want?

The centralised, AI-mediated access to media content also raises a number of ethical and legal issues, questioning the role of lawmakers and media platforms in regulating cultural and creative content distribution in order to prevent discrimination or under-representation[43]. The data used as inputs to AI-based algorithms, and the design of the algorithms themselves, can induce racial, gender, and other biases, with dramatic implications. At the time of writing this report, the image recognition service provided by Google has unacceptable racial biases. For instance, a dark skinned person with a hand-held thermometer is classified as "gun" while a lighter skinned person with the same tool is classified as "technology"[44]. This is highly problematic as this service is used in many image processing products. **Ethical frameworks** have recently been proposed[45], pushing for accountable, transparent and inclusive algorithms. Ethical frameworks provide necessary good practices. However, it is unrealistic to expect the platforms themselves to self-regulate, as also reported in Kulesz (2018). This report states it clearly: "it is vital to create multi-stakeholder processes that enable the formulation of policies and measures to **safeguard** the public interest and establish clearer degrees of responsibility in cases where the use of technology produces unintended consequences".

Conclusions
- The use of AI for media content brings up issues regarding cultural and linguistic diversity.
- There is active research on accounting for cultural and linguistic diversity with respect to AI.
- Public policies and measures are required to prevent all forms of discrimination in AI-based distribution platforms.

AI governance and appropriation by people

As these technologies spread in the CCS, there is an increasing demand for **AI-related skills**. Integrating and deploying data-driven AI technology at scale requires computational resources and technical skills, including data management, algorithm design, and user interface design.

We observed an increasing **centralisation of AI governance** towards tech giants such as Google, Facebook, Amazon, or Nvidia. Most AI start-up companies in the Union, be it in the CCS or in other sectors, are implementing their technological solutions using programming libraries provided by these companies[46], and using these platforms' cloud-based computational resources such as GoogleCloud or Amazon Web Services. Tech giants have succeeded in placing themselves as mandatory resource providers in AI-related research and innovation across many sectors. In the

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[42]   Helberger et al. (2018). Exposure diversity as a design principle for recommender systems. *Information, Communication & Society*, *21*(2)

[43]   Brin et al. (2018). Promouvoir la diversité des expressions culturelles à l'ère numérique: le rôle de l'État et des médias. *Les Cahiers du journalisme-Recherches*, (NS 2), pp.R49-R68.

[44]   https://twitter.com/nicolaskb/status/1244921742486917120?s=20

[45]   Including: Asilomar AI principles https://futureoflife.org/ai-principles/; Ethics Guidelines for Trustworthy AI https://ec.europa.eu/futurium/en/ai-alliance-consultation; Tenets of the Partnership on AI https://www.partnershiponai.org/tenets/

[46]   Start-ups proposing deep learning based solutions are widely using either Tensorflow (by Google), or Pytorch (by Facebook)

CCS, Google Arts & Culture in Paris proposes art residencies where artists have access to the company's AI technology. As mentioned above, artists are assisted by Google engineers, or freelance artists contracted by Google, to help them handle the technology[47].

Actors in the CCS are usually not computer scientists nor data scientists. Some artists have chosen to acquire AI skills and managed to **appropriate** state of the art AI algorithms that are freely available on platforms such as Github, usually as open source software, contrary to the data used to train them. Nonetheless, in our interviews, artists reported that appropriating deep learning algorithms can be a major bottleneck due to the pace at which these algorithms are released, the lack of thorough documentation, and their opaque behaviours (testing them can require hours, following a trial-and-error procedure). Then the great majority of artists and curators are not familiar with such a technology. As reported in the 2018 UNESCO report[48], there is a danger of creating a tighter dependency on third-party solutions or to exclude artists and curators from access to AI technologies. How can AI be brought closer to those who have less access, and who know less? How can AI be made more **inclusive, usable, learnable,** and **interactive**? This is where the public sector could play a major role, through their research centres, universities and cultural institutions. These stakeholders could steer AI technology towards the public interest (education-oriented, non-profit, visionary), without being driven by the market[49]. Research and development should foster a **human-centric** approach to AI. Dedicated funding instruments supporting software development within universities or other non-profit research centres are needed.

Conclusions
- AI governance is centralised which has an impact in the CCS.
- Funding instruments are needed for supporting less-centralised, human-centred AI. This endeavour can be partially undertaken by universities and other non-profit insitutions.

AI in European Arts & Culture

A growing European community is developing a practice of **AI in visual art** (for example Anna Ridler (UK), Mario Klingemann (DE), Memo Akten (UK), Rocio Berenguer (SP/FR), or Jonas Lund (SE)). Artists are supported by the growing interest of institutions in providing more space for AI within the Arts. Ars Electronica, the world-known Austrian festival and museum on Art and Technology, dedicated its 2017 festival edition to "AI: the Other I". Since then, every year, workshops and special sessions are dedicated to this theme during the festival. In France, the Grand Palais proposed an ambitious exhibition called "Artists and Robots" in 2018 and, at the time of writing, the Centre Pompidou has an ongoing exhibition on "Neurons. Simulated Intelligence". The Barbican in London also featured an AI-dedicated exhibition called "AI: More than Human". Other European museums and galleries that have hosted AI art include Sonar Festival (Barcelona), Toca Me Festival (Munich), Beyond Festival (Karlsruhe), Hek (Basel), ART-AI Festival (Leceister), Circolo del Design (Torino), Aksioma (Ljubljana), Impakt (Utrecht), Kikk Festival (Namur), and Watermans Art Centre (London). This is very positive, but it also highlights a skewed distribution of initiatives across the Member States. Northern and Western Member States are the most represented.

Art residencies also provide opportunities for artists to create networks, to stimulate technological innovations, and to acquire new expertise. The S+T+ARTS (Science, Technology & the Arts) initiative from the European Commission offers residencies for artists, coordinated by

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IRCAM in Paris. More specific to AI and Art, the European ARTificial Intelligence Lab, funded by the Creative Europe Programme, offers residencies in one of 13 cultural operators in the Union, including Ars Electronica in Linz. Surprisingly, there are very few other projects on AI and culture that have been funded by the Creative Europe programme[50]. Here, specific instruments could be introduced to support the development of artistic residencies focused on AI-Art, and Technology in the CCS in general across Europe. In the private sector, as already mentioned, Google Art & Culture in Paris provides short- and long-term art residences where artists can explore AI as a companion in artistic creation. Artists may be chosen by the company or through an open call in collaboration with partner institutions. The strength of these residencies is the access to data and computational ressources, as well as technical support.

In a recent seminar titled "E-relevance of Culture in the Age of AI", sponsored by the Council of Europe[51], certain stakeholders gathered to discuss culture, creativity and AI. They highlighted the need for supporting the development of **critical discourse** on technology and AI by the general public. Two of their proposed actions are: establishing a permanent "AI observatory that would closely follow and scrutinise new developments in AI regarding the consequences for Human rights, Democracy and the Rule of Law", and proposing workshops to media industries to "clarify the field of Artificial Intelligence with the aim of stimulating the quality of public dialogue with all its consequences". In the long run, a coherent vision of AI in the CCS in Europe, promoting cultural and linguistic diversity as well as human-centric AI, would benefit from the creation of a committee of stakeholders who would incentivise actions promoting critical discourse, arts practice and innovation.

Conclusions
- The Union has developed a dynamic space to critically explore AI through the Arts. However this is not evenly distributed across the Member States.
- Art and Technology residencies in Europe need to be supported as they result in the development of critical discourse on technology and AI by the general public.
- A committee of stakeholders should be created to support a human-centric approach to AI in the Union in the long run.

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[50] This observation is based on the analysis of the list of the projects funded by the programme, which is available online at: https://ec.europa.eu/programmes/creative-europe/projects/ce-projects-compendium/
[51] https://www.coe.int/en/web/culture-and-heritage/-/e-relevance-of-culture-in-the-age-of-ai

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Appendix

Generative algorithms have know impressive progress since the introduction of the deep learning technique called **Generative Adversarial Network** (GAN)[52]. The idea behind a GAN is that two networks are trained at the same time: a discriminator that aims to discriminate between real and generated images, and a generator that generates an image such as fooling the discriminator, that is to say making the discriminator classifying the generated image as real. In other words, the generator intents to generate images the most indistinguishable from real images used as training

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[52] Goodfellow et al. (2014). Generative Adversarial Nets. In *NeurIPS*

set. Many extensions have since been proposed[53]. See the following project examples (international):

- A painting generated with a GAN has been sold at Chritie's auction house for $432,000[54]
- High-resolution realistic face generation system using StyleGAN2[55]
- User-controlled photorealistic creations using GauGAN[56]
- Music generation using GANSynth[57]

Acknowledgments

Further information

This briefing is available at: https://bit.ly/3lEaBji

More information on Policy Department research for CULT :
https://research4committees.blog/cult/

53   https://machinelearningmastery.com/tour-of-generative-adversarial-network-models/
54   https://www.christies.com/features/A-collaboration-between-two-artists-one-human-one-a-machine-9332-1.aspx
55   https://www.thispersondoesnotexist.com/
56   http://nvidia-research-mingyuliu.com/gaugan
57   https://magenta.tensorflow.org/gansynth