MONDIACULT 25
ESPAÑA

Report of the Independent Expert Group on

Artificial Intelligence and Culture

2025

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ACKNOWLEDGEMENTS

EXECUTIVE SUMMARY

The **Independent Expert Group on Artificial Intelligence and Culture (CULTAI),** convened by UNESCO, examined how AI is reshaping creativity, heritage and cultural ecosystems worldwide. The Group's analysis highlights an urgent reality: artificial intelligence is advancing faster than cultural governance, widening divides and raising new risks, while also offering powerful opportunities to reinforce cultural innovation and resilience.

AI is already transforming how culture is created, shared and preserved. It can expand access, safeguard heritage, amplify diverse voices and open new creative possibilities. At the same time, it can deepen inequalities, intensify biases, accelerate cultural homogenization and increase environmental costs.

The report identifies **core challenges:**
- **Outpacing of governance**, as the acceleration of AI exceeds the capacity of cultural ecosystems to adapt, threatening sovereignty, pluralism and democratic oversight;
- **Reinforcement of bias and homogenization**, as unbalanced training data and algorithmic personalization reproduce stereotypes and foster monocultures;
- **Undermining of cultural rights**, through the exploitation of unprotected cultural data without consent, attribution, or compensation and the marginalization of minority cultures; and
- **Erosion of creativity and skills**, as overreliance on AI weakens human creativity and cognitive capacities.

It also highlights **opportunities**, notably:
- **Expansion of creativity and access**, by lowering entry barriers and enabling new creative forms;
- **Protection of cultural heritage**, through restoration, conservation, post-disaster response and the preservation of endangered languages;
- **Strengthening of cultural and creative industries**, as automation of routine tasks reduces costs and enhances the competitiveness of small enterprises; and
- Advancement of equitable **learning opportunities**, with museums and cultural institutions cultivating AI literacy, creativity and critical reflection.

The Independent Expert Group calls for global cooperation and inclusive governance to ensure that AI strengthens cultural diversity, equity and sustainability. Rights-based approaches to AI, green practices, fair creative economies and sustainable cultural futures must place human creativity and cultural rights at the centre of technological development.

Culture and Artificial Intelligence

Challenges
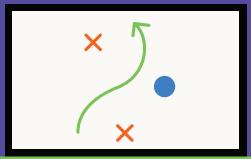
Rapid technological
acceleration
in creative sectors
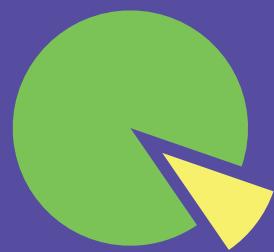
Unequal access
across regions
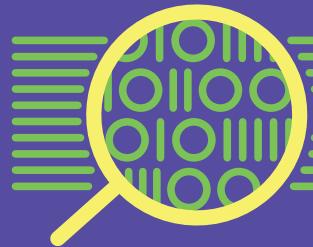
Rising ethical concerns
around rights and
ownership

Imperatives

Rights-based AI
governance:
transparency,
safeguards, fair
compensation

Fair & diverse creative
economies: algorithmic
diversity, public
infrastructure, skills
development

Sustainable & resilient
futures: low-impact AI,
heritage protection,
inclusion of local
knowledge

I. INTRODUCTION

In today's fast-changing digital landscape, Artificial Intelligence (AI) has become a critical issue for cultural policy and demands urgent, coordinated international attention. As AI tools are integrated into cultural ecosystems, they bring a dual reality: on the one hand, unprecedented opportunities for creativity, innovation and heritage protection; on the other, complex ethical and practical risks.

Over just a few years, AI has shown its ability to generate cultural content, lower production costs, reconstruct fragmented heritage and reveal creative processes otherwise inaccessible to human perception. Yet these same technologies also risk reinforcing algorithmic bias, obscuring cultural distinctiveness, widening inequalities and even exacerbating injustice.

This tension, between fascination and mistrust, defines the challenge before us. AI no longer simply imitates existing works; it combines and interprets them, raising pressing questions of authorship, ownership and cultural dispossession. How do we ensure AI enriches human creativity instead of homogenising it? How can we foster innovation while protecting cultural diversity and identity?

This duality of technological empowerment and potential cultural erosion is the central concern of this Report. Guided by UNESCO's human-centred vision, it responds to the call of the UNESCO World Conference on Cultural Policies and Sustainable Development 2025 (MONDIACULT 2025) for international frameworks that harness AI's potential while safeguarding cultural rights, diversity and sovereignty.

The Report of the Independent Expert Group on AI and Culture (CULTAI-M25) forms part of the preparatory work for MONDIACULT 2025, to be held in Barcelona from 29 September to 1 October 2025. The conference will bring together all UNESCO Member States to shape future global cultural policies. Within this, the theme of Artificial Intelligence and Culture addresses three urgent, converging challenges:
1. The rapid acceleration of AI that is transforming cultural ecosystems,
2. Persistent digital divides between regions and communities, and
3. Escalating ethical risks, from deepfakes to systemic bias.

Meeting this urgency requires a clear strategy built around three imperatives:
1. Frame AI governance to uphold human creativity and integrity.
2. Leverage AI to amplify cultural diversity and pluralism.
3. Protect heritage and vulnerable communities from harmful impacts.

To inform this agenda, UNESCO mandated CULTAI-M25 to prepare this Report. The Group brought together ten international experts and two youth representatives, including cultural practitioners, researchers, artists and entrepreneurs. Its work combined two perspectives: analysing AI's impact on cultural practices and developing actionable policy ideas based on innovative practices and real-world examples.

The Report is structured into seven thematic sections, offering a global, multidisciplinary perspective:
- Ethical landscape of AI in culture
- Cultural rights in the digital age
- AI and cultural value chains in the creative economy
- AI and cultural education
- Culture, climate and environmental sustainability
- Heritage at risk and AI
- AI, freedom and sovereignty

This Report reflects both academic research and practical experience and is grounded in UNESCO's evolving normative ecosystem.

Key references include the Convention on the Protection and Promotion of the Diversity of Cultural Expressions (2005) and its Operational Guidelines for the Digital Environment (2017), the Montreal Declaration for Responsible Development of Artificial Intelligence (2018), the Global Reports of the 2005 Convention (2018 and 2022), the Recommendations on the Ethics of Artificial Intelligence (2021) and the Recommendations of the Reflection Group on the Diversity of Cultural Expressions in the Digital Environment (2024).

The CULTAI-M25 Report embodies an inclusive, forward-looking approach. It aims to raise awareness, inspire policy dialogue and encourage concrete commitments at MONDIACULT 2025, guided by a simple principle: technology must serve humanity, not the reverse.

II. MAPPING THE ETHICAL LANDSCAPE OF AI IN CULTURE

A

AI, a Double-edged Tool: Opportunities and Challenges for Culture

The close interplay between artificial intelligence (AI) and culture is by no means a recent phenomenon. For years, AI technologies have been employed in the cultural sector for purposes such as algorithmic content recommendation, automated transcription of audio files and behavioural analysis to personalize experiences. However, the transformative turning point has been the emergence of generative AI, notably marked by the launch of ChatGPT in late 2022. This type of AI enables the creation of diverse cultural expressions of the highest technical quality, thanks to increasingly efficient models trained on vast databases composed of texts, images, videos and songs, among other media.

1. OPPORTUNITIES

It is important to note that AI, in both its generative and non-generative forms, presents significant opportunities for the cultural sphere but also considerable challenges.

Among the advantages, AI can enhance the creative potential for artists in a phenomenon commonly referred to as the 'augmented artist' (Edwards, 2023), where AI tools extend an artist's capabilities by enabling new forms of expression, idea generation and accelerated creative processes. It also lowers entry barriers for creation, allowing individuals without specialized training in a particular artistic discipline to produce artworks. For instance, a user with no background in music arrangement can compose a song in any genre using applications like Udio, Suno and many others.

Additionally, AI can foster interdisciplinary collaboration, connecting the cultural sector with technology stakeholders, which can lead to new forms of creation and experimentation. Moreover, the intersection of technology and culture generates specialized roles, creating new job opportunities. In the cultural and creative industries, AI streamlines processes that previously required significant time and resources, across a wide range of sectors. For example, an independent studio working in film or post-production can now automate video editing through AI, with cuts, transitions and even sound design adjusted in minutes. This undeniable boost in productivity benefits not only major players but especially cultural Small and Medium Size Enterprises (SMEs), which can now compete in terms of speed and quality with more established companies.

Furthermore, AI can contribute to the field of cultural heritage, both tangible and intangible, through digital preservation, virtual reconstruction, data analysis, as well as the transcription and documentation of endangered oral traditions and performance practices. It also plays an emerging role in the protection of heritage under emergency conditions—such as post-conflict or following natural disasters—by enabling rapid assessment and informed recovery efforts (see Section VI). Another significant benefit is the expanded access to culture for the public, as the use of AI in cultural creation results in an abundant cultural offering.

2. CHALLENGES[1]

However, the challenges are also numerous. A major concern is the skills gap: many traditional artists struggle to adapt to an AI-driven environment due to limited technical training. Job displacement is partly linked to the previous issue, as automating creative tasks could threaten traditional artistic jobs, including musicians, translators, proofreaders, illustrators and designers, among many others. According to a report released in late 2024, music sector workers could lose nearly 25% of their income to generative AI by 2028, while those in the audiovisual sector may face a 20% drop (CISAC, 2024). Economic concentration poses a risk as well, given that the dominance of large tech platforms may lead to dependency for smaller cultural actors. Indeed, developing and training their own models is often beyond the technical and financial reach of less resourced players, not only due to the complexity of the process but also because access to high-quality datasets remains limited.

Moreover, cultural, linguistic and gender biases present in training data can be transferred to artistic creations and cultural heritage preservation, perpetuating stereotypes and inequalities. Intellectual property issues are also prominent, as most of the generative AI tools currently available on the market have used copyrighted content without authorization to train their models. Partly linked to this is the risk of cultural appropriation of local expressions by major technology firms, causing decontextualization and misrepresentation, particularly when AI systems draw on material from indigenous or marginalized communities.

Additionally, personalized AI-driven creation may lead to cultural atomization, exacerbating dynamics similar to algorithmic filter bubbles by generating new, highly individualized content, thus further weakening social cohesion. Another challenge is North-South inequality: the lack of technological resources and the concentration of AI centres in the Global North risks accelerating the migration of workers in the cultural and creative industries toward employment in the Global North, exacerbating the digital and creative gap.

Finally, universal access to culture is at risk, as unequal control over AI tools and platforms combines with disparities in digital technologies, skills and knowledge, restricting participation to those with the necessary resources and capabilities and undermining the principle of culture as a global public good.

B

Overview of key UNESCO and UN initiatives at the intersection of AI and Culture

The ethical dimension of AI has gained growing attention since the second half of the 2010s. Numerous declarations, ethical frameworks and normative instruments, at national and multilateral levels have sought to guide its responsible development.

Early milestones include the *Montreal Declaration for a Responsible Development of Artificial Intelligence,* drafted in 2017, which explicitly emphasized the necessity of safeguarding cultural diversity and preventing societal homogenization (Montreal Declaration, 2018).

UNESCO's active involvement in the AI dialogue, grounded in a cultural perspective, has amplified the issue's prominence on an international scale. In the second 2005 Convention Global Report

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[1] The term "challenges" here encompasses both the barriers that hinder the ability to seize the opportunities as well as the new threats emerging from the evolving technological landscape.

Re|shaping Cultural Policies, published at the end of 2017, it is noted that while AI can offer substantial benefits, it also poses significant risks when understood not only as a technology for recommending content but as a generative tool capable of creating original material on a large scale, potentially affecting creative employment and leading to market concentration within the cultural sector (Kulesz, 2017). Moreover, the special edition of the UNESCO Courier from July-September 2018 addressed the impact of AI in various fields, including the challenge of creativity in the AI era and the fact that this technology represents not just a technical transformation but also a 'cultural revolution' (UNESCO, 2018).

In December 2018, the information document *'Culture, Platforms and Machines: the Impact of Artificial Intelligence on the Diversity of Cultural Expressions'* introduced additional variables, including the North-South gap in artistic creation in the age of AI, the difficulty of determining copyright ownership in AI-generated works, the need to respect the rights of artists whose works have been used to train generative AI systems and the problem of biases in AI-generated creations, among other concerns (Kulesz, 2018). In 2019, the COMEST *Preliminary Study on the Ethics of Artificial Intelligence* revisited these matters and added other key challenges related to linguistic diversity and cultural heritage in the AI era (COMEST, 2019, 14-17).

All these efforts converged in 2021 in the UNESCO *Recommendation on the Ethics* of AI (2021), the first and so far, the only global normative instrument on AI that explicitly includes culture as a specific domain (Policy Area 7). In particular, the Recommendation encourages the use of AI systems to preserve, enrich, manage and increase access to cultural heritage, including endangered and indigenous languages, through participatory and educational approaches. It also promotes assessing the cultural impact of AI, particularly in natural language processing, to mitigate risks to linguistic diversity. AI education for artists and creative professionals is encouraged to ensure cultural diversity and artistic freedom are preserved. Additionally, the guidelines advocate for raising awareness among local cultural industries about AI tools to prevent market concentration and for engaging tech companies in enhancing the visibility of local content. Furthermore, they support research at the intersection of AI and intellectual property, addressing the impact of AI on creators' rights.

Finally, cultural institutions such as museums, galleries, libraries and archives are invited to use AI systems to enhance their collections and improve public access.

The *Recommendation* proved to be forward-thinking, anticipating several challenges that would only become evident years later with the proliferation of large language models and chatbots for text generation and diffusion models for creating images and videos. It arrived at a timely moment, as most countries were in need of guidance for the development of their national AI strategies and, as highlighted in the Global Report *Re|Shaping Policies for Creativity* (Ochai, 2022, 96), the existing plans at the time generally did not include specific references to the cultural dimension.

Since then, UNESCO has developed tools targeted to monitor progress in the implementation of the 2021 *Recommendation*, such as the Readiness Assessment Methodology (RAM), created in 2023 to ensure the ethical use of AI (UNESCO, 2023a). The RAM includes some of the cultural variables outlined in the *Recommendation*, such as the preservation of cultural heritage (indicator 3.2.5.1) and the protection of linguistic diversity (indicators 3.2.1.9, 3.2.1.10 and 3.2.5.2).

The MONDIACULT 2022 Declaration, in turn, emphasizes the transformative role of digital technologies in culture. It calls for expanding learning outcomes and quality education and stresses the need for regulation of the digital sector and large platforms to ensure online cultural diversity, artists' rights and equitable access to content. It also urges UNESCO to assist Member States in upholding cultural rights, facilitating equitable access to cultural markets, leveraging digital technologies for cultural employment and enhancing the safeguarding, promotion, digitization and inventorying of cultural heritage.

In 2023, UNESCO released the *Guidelines for Regulating Digital Platforms: A Multistakeholder Approach to Safeguarding Freedom of Expression and Access to Information,* which address how online platforms should operate, including how they use AI in content moderation (UNESCO, 2023b). The guidelines emphasize the need to consider cultural and linguistic diversity and recommend audits for AI bias across different languages and contexts.

For its part, the UNESCO *Framework for Culture and Arts Education*, developed in 2024, covers a wide range of topics, while also recognizing the impact of AI on the field (see Section 7). It highlights both the opportunities AI presents for creativity and learning and the risks, calling for the ethical and responsible use of this technology (UNESCO, 2024a).

Also in 2024, UNESCO convened a reflection group to analyse in-depth various themes related to the diversity of digital expressions in the digital and AI era. The group developed a set of strategies for integrating digital technologies and AI into the creative sectors (UNESCO 2024b). These strategies highlight the need to promote greater transparency in the use of AI throughout the cultural value chain and to ensure fair remuneration for creators. Additionally, they advocate for enhancing UNESCO's internal coordination on AI and culture-related matters and strengthening capacity building in these areas, particularly in Global South countries.

At the broader level of the United Nations, it is worth noting the 'Global Digital Compact', included as an annex to the *Pact for the Future*, published in September 2024 (United Nations, 2024, 37-51). Objective 5 of the Global Digital Compact, titled *Enhance international governance of artificial intelligence for the benefit of humanity*, underscores, among other points, that AI applications should "foster diverse cultures and languages and support locally generated data for the benefit of countries and communities' development." The text explicitly refers to the 2021 *Recommendation* as a foundational reference for these guidelines. Moreover, the Resolution adopted by the UN General Assembly on 21 March 2024, titled *Seizing the Opportunities of Safe, Secure and Trustworthy Artificial Intelligence Systems for Sustainable Development* (A/RES/78/265), whose operative paragraph (m) states "Promoting artificial intelligence systems that advance, protect and preserve linguistic and cultural diversity, taking into account multilingualism in their training data and throughout the life cycle of the artificial intelligence system, particularly for the large language models".

C

Other instruments and regulations

Since 2024, many regional and national AI strategies have explicitly integrated cultural considerations.

The EU AI Act, which entered into force on August 1, 2024, constitutes one of the most comprehensive legal frameworks on AI globally (European Union, 2024). It categorizes AI systems into four distinct risk levels: those with minimal risk, limited risk, high risk and unacceptable risk. For generative AI, it establishes clear transparency and disclosure protocols (Article 50). General-purpose AI and foundational models are subject to strict regulations regarding technical documentation, training data and safeguards for copyright (Article 53).

In the Global South, it is worth highlighting the African Union (AU) Continental AI Strategy, adopted in July 2024. Its mission is to "harness AI for accelerating social and economic transformation and promoting cultural renaissance in Africa in line with the AU Agenda 2063 and the Sustainable Development Goals" (African Union, 2024). Among its many pillars, the document emphasizes the importance of preserving Africa's cultural heritage, linguistic diversity and indigenous knowledge.

In Latin America, for its part, numerous countries have begun to outline AI strategies that explicitly refer to the impact of this technology on culture. The updated National AI Policy document of Chile

(2024) includes specific sections on 'Creation and Intellectual Property', proposing an updated IP system to balance AI-based innovation and creators' rights and on 'Culture and Preservation of Cultural Heritage,' recommending the development of AI capabilities for the ethical and sustainable preservation of material and immaterial cultural heritage (MinCiencia, 2024). The update process for this policy, along with citizen deliberation, was informed by the UNESCO RAM methodology. In December 2024, the Brazilian Senate approved the AI Bill—still requiring approval from the Lower House—, which includes a chapter on copyright protections; it requires developers to disclose the copyright-protected materials used to train AI systems and establishes a regulatory body to manage payments to creators (Senado Federal, 2024). Finally, Colombia's National AI Policy document, published in February 2025, emphasizes the need to respect local customs, address the lack of cultural and linguistic diversity in data to combat bias and examine both the opportunities and risks AI poses for creativity and cultural heritage management (CONPES, 2025).

In several Asian countries, national AI strategies also include explicit references to cultural themes. For instance, Uzbekistan's AI Development Strategy (2024–2030), adopted in October 2024 through Presidential Resolution No. RP-358 (President, 2024), includes measures to provide high-quality and interactive services for tourists at cultural sites, including museums (section 3.2.f). Sri Lanka's draft National Strategy on AI, released for public consultation in July 2024 (CFSAI, 2024), features a dedicated section in Annex 11 on linguistic diversity and cultural heritage, which emphasizes the development of local language LLMs, ethical data curation and the integration of minority languages into digital platforms to help preserve cultural knowledge for future generations.

The development of the G7 Hiroshima Process International Code of Conduct for Organizations Developing Advanced AI Systems (2023) builds upon the G7 Hiroshima Process International Guiding Principles for Organizations Developing Advanced AI Systems. The Code aims to provide voluntary guidance for organizations developing the most advanced AI systems, including foundation models and generative AI systems.

D

Conclusions

Over the past decade, the expanding influence of AI on culture has been paralleled by a growing body of policy initiatives. UNESCO has played a pioneering role, particularly through the 2021 *Recommendation* on the Ethics of AI, as well as through ongoing normative instruments and monitoring tools. Since the adoption of the *Recommendation*, which coincided with the accelerating influence of generative AI systems on the creative sectors, an increasing number of countries and regions have begun to incorporate cultural aspects into their AI strategies and regulatory frameworks.

Nevertheless, significant gaps remain. Given the global nature of these transformations, it is essential that all countries develop national AI strategies that incorporate the cultural dimension. Impact assessment frameworks, such as UNESCO's RAM, could be strengthened by incorporating indicators on cultural risk preparedness and AI's contribution to resilience, including in heritage-related emergency planning. Furthermore, attention must extend beyond heritage to contemporary cultural production, ensuring that monitoring instruments reflect the full range of issues outlined in the 2021 *Recommendation.*

Detailed, sector-specific guidance, already developed for education, should be produced for culture, structured around the *Recommendation's* key pillars. This Report aims to serve as a roadmap in that regard, to be revised as technologies evolve.

The Report addresses:
- Cultural rights and cultural education in the context of the AI and digital era
- The impact of AI on cultural and creative industries and the creative economy
- Preservation of endangered heritage and the role of international cooperation
- Cultural sovereignty and freedom in the face of new forms of control and representation
- Environmental impacts of AI technologies on cultural sectors

Given the growing impact of AI capabilities and their integration into cultural processes, these considerations are urgent.

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III. CULTURAL RIGHTS IN THE DIGITAL ERA: EQUITY, DIVERSITY AND THE PROTECTION OF CULTURAL COMMONS IN THE AGE OF AI

A

Reassessing the bond between culture and AI: Recognizing the cognitive value of cultural data

From the late 1990s to the early 2000s, digital technologies and the Internet expanded beyond specialized institutions, to become central spaces for cultural expression, communication and knowledge exchange. This transformation revealed that digital data could be valued not only for its economic potential, but also for its cultural significance, as a living record of social life in digital environments. Over the last two decades, however, policy and industry attention has prioritised the economic value of data as a resource to be monetised, contributing to the commodification of everyday life and culture.

Cultural goods, services and activities inherently possess a dual nature: they hold cultural value, as representations of identity and expression of diverse social groups and economic value, as tradable assets within the cultural industries (UNESCO, 2005, 2017). Within their cultural dimension, the cognitive value of cultural expressions has become increasingly relevant. As culture becomes increasingly datafied[2], the digital traces of everyday life contribute to the production of what can be termed cultural data, encompassing data and metadata related to digitized heritage, online cultural practices and digitally created, distributed and consumed cultural goods – representing the cognitive value.

The concept of 'cultural data' requires further refinement to clarify how cultural expressions are embedded within AI systems and to establish a foundation for their recognition and protection. This section proposes a conceptual framework, conceiving cultural data as digital traces, both intentional and unintentional, that capture cultural expressions, practices and heritage.

A typology comprising two principal categories is outlined:
1. Explicit Cultural Expressions
2. Implicit and Latent Cultural Expressions

This distinction rests on the state of manifestation of the cultural expression, whether it is fully manifested (explicit) or remains potential (implicit/latent). Additional attributes relevant to the comprehension and governance of cultural data include the degree of intentionality in its creation and the extent of human agency involved.

Explicit Cultural Expressions encompasses cultural outputs that arise from conscious, intentional acts of creation, as well as from practices that, while not initially intended as cultural expressions, are subsequently recognised as such —often retrospectively and in aggregated form. Intentional examples

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[2] Datafication, according to Mayer-Schoenberger and Cukier (2013) is the transformation of social action into online quantified data.

include artistic productions, audiovisual works, literary creations, performances and other cultural outputs deliberately conceived within a cultural framework. These works are typically authored by identifiable individuals, groups or communities and reflect shared values, identities and worldviews. Other explicit expressions may originate without deliberate cultural intent, but once such cultural registers are identified and acknowledged, particularly in their aggregated forms, they become explicitly recognized as cultural expressions or cultural heritage. This can be the case of traditional tools preserved as heritage, public spaces becoming cultural landmarks or community rituals gaining heritage status.

The second category, Implicit and Latent Cultural Expressions, refers to the vast volumes of digital cultural data generated through unintentional acts of cultural expression, often arising from the large-scale digitization of social, communicative and behavioural processes. While individual data points constitute discrete cultural expressions, their broader cultural significance emerges when aggregated, forming new, large-scale cultural expressions and reflecting collective patterns, societal behaviours and shared values. These expressions, produced on a massive and diffuse scale, are generally not attributable to specific authors. In some respects, they resemble forms of cultural heritage which, while not originally conceived as expressive acts, acquire cultural significance over time by documenting collective ways of life and shared social practices.

In terms of their state of manifestation, Explicit Cultural Expressions have (at least, partly) realized their cultural value at the time of creation, in intentional contexts, or at the moment of recognition, in unintentional contexts. Their cultural significance is embedded both in the intentional act of expression and in the meanings attributed to them by creators, audiences and communities. Implicit and Latent Cultural Expressions, by contrast, hold potential cultural value that is unleashed only upon their recognition. In the context of AI systems, this occurs when vast amounts of such data are mobilized to train and develop models. Here, the cultural dimension is not inherent to individual data points but is realized through large-scale aggregation, analysis and computational training. These processes are essential to producing the cognitive capabilities of AI systems, which, once operational, acquire an active cultural

agency, insofar as they can reproduce, simulate or reinterpret cultural content and practices.

This reveals an important but unrecognized collective dimension of cultural data. Beyond individual-level protections such as intellectual property rights, there exists a collective dimension of cultural data (patterns, norms and values) that emerge only at scale through the aggregation of many data points. These aggregated cultural signals, reflect the identity, norms and values of communities. These collective cultural expressions are largely unacknowledged in law and policy and therefore unprotected. Conceptualizing this collective latent dimension of cultural expressions is essential for safeguarding cultural heritage in the AI era, where large datasets can both preserve and transform cultural patterns over time.

AI systems derive their cognitive capabilities not only from their algorithmic architectures but also from the cultural data they process. As such, they can be regarded as forms of collective intelligence, shaped by decades of digitally mediated social interaction and cultural production. The current state of artificial cognition is therefore deeply embedded in, and inseparable from, the datafied cultural landscapes of recent decades. This reality underscores the need to recognize, govern and safeguard the cultural dimensions that underpin these technologies.

Ensuring equitable development and responsible governance of AI in the cultural sector requires recognition of the cognitive value embedded in cultural data. In particular, Implicit and Latent Cultural Expressions should be considered a collective common good and a constitutional element of culture. Culture has previously been recognized as a global public good, with intrinsic value for enabling and driving sustainable development, as affirmed by the Ministers of Culture of UNESCO Member States in the *MONDIACULT 2022 Declaration* (UNESCO, 2022).

Cultural data, as a collective common good, emerges at scale through the aggregation of countless individual data points. It should belong to and serve the community as a whole, yet it remains largely unrecognized and unprotected. Framing cultural data in this way challenges perceptions of AI as purely novel or exclusively technical, instead emphasizing the cultural and historical conditions that underpin its development. This perspective underscores

the need for cultural policies and regulatory frameworks that protect the cognitive value of cultural data and activate mechanisms to enhance cultural rights in this transformed landscape.

This recognition demands the establishment of inclusive governance frameworks and fair access agreements for AI systems. Communities and individuals whose cultural contributions, whether Implicit or Explicit, shape artificial cognition must be acknowledged and benefit from these systems. Currently, these systems are largely constructed through the unremunerated appropriation of such cultural data, while the contributors are even required to pay for access to advanced AI tools built on their own cultural data. This asymmetry raises urgent questions about cultural rights in the digital age. Participation in cultural life, a core element of contemporary society, must be protected in accordance with internationally recognized rights, as enshrined in Article 27 of the *Universal Declaration of Human Rights* (1948) and Article 15(1)(a) of the *International Covenant on Economic, Social and Cultural Rights* (1966).

New social and political agreements are necessary, treating culture as a foundational driver of innovation rather than merely as extractable content. Such frameworks must ensure fair recognition, equitable access and benefit-sharing mechanisms that safeguard cultural rights and help reduce digital divides.

To address these challenges, governance frameworks should rest on three interlinked pillars:

1. Recognition: Legally define 'cultural data' and its collective dimension, expanding protections to cover aggregated cultural patterns that emerge from large-scale data aggregation.
2. Access: Require AI developers and data controllers to provide preferential or free access to communities whose cultural data significantly contributed to the training of their models. This must be accompanied by transparent reporting on how cultural data is sourced and used.
3. Benefit-sharing: Establish cultural data trusts or collective licensing schemes to ensure that revenues generated from AI products trained on cultural data are equitably shared with relevant communities, cultural institutions and creators.

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B

Ensuring equitable access to AI tools in the culture sector

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Equitable access to AI is essential for protecting cultural rights and ensuring diversity in the digital age. As AI becomes increasingly integral to artistic creation, production and distribution, disparities in infrastructure, cost and technical capacity risk deepening existing inequalities, across the cultural and creative sectors.

Access to AI tools is often mediated by commercial platforms, proprietary systems and high computational costs. These barriers place creators from the Global South, Indigenous groups and other marginalized communities at a structural disadvantage. The concentration of control over AI infrastructure within a small number of corporate actors limits the ability of diverse cultural stakeholders

not only to use these systems but also to participate meaningfully in their development, deployment and governance.

The *Recommendation on the Ethics of Artificial Intelligence* (UNESCO, 2021) calls for inclusive and equitable access to AI, particularly in cultural contexts. It emphasizes the need to support creators and audiences across the entire digital value chain. This entails not only access to generative AI tools and content recommendation algorithms, but also to the underlying data, knowledge resources and training opportunities required to use and shape these technologies.

Public institutions have a critical role to play in creating enabling environment. This includes investment in open-source AI systems, public AI infrastructure and capacity-building initiatives tailored to the needs of cultural actors.

At the same time, equitable access must be reconciled with the protection of creators' rights. The *Operational Guidelines on the Implementation of the 2005 Convention in the Digital Environment* (UNESCO, 2017) highlight the inherent tension between fostering cultural diversity and ensuring fair remuneration for creators and performers. In this context, policies to expand access to AI should therefore be designed in parallel with measures that uphold the rights of creators and performers to receive fair remuneration and recognition for their contributions.

It is equally important to determine how AI is made available, in ways that respect cultural self-determination and foster inclusive innovation. Policy frameworks should therefore prioritize open-source, multilingual and community-driven AI ecosystems that reflect diverse cultural contexts. This includes funding for co-created datasets; AI literacy programmes because access must be paired with education and capacity building, not only with technical availability; and shared technological infrastructure, alongside regulations that ensure transparency and accountability in AI use.

C

Addressing algorithmic biases and safeguarding cultural diversity in AI systems

As AI technologies increasingly mediate access to cultural content, goods or services, curate user experiences and shape patterns of visibility and recognition, the risks of reproducing or amplifying existing cultural hierarchies have become more acute. Algorithmic systems are not culturally neutral; they are trained on datasets that often reflect historical inequalities and dominant epistemologies, resulting in biased outputs that can marginalize and misrepresent minority cultures, languages and forms of expression. These biases are particularly visible in generative AI systems, content recommendation algorithms and automated moderation tools used across major digital platforms.

Empirical research has documented these risks. The landmark *Gender Shades* project (Buolamwini and Gebru, 2018) revealed significant disparities in the accuracy of commercial facial recognition accuracy systems across gender and skin type, evaluating commercial systems from IBM, Microsoft and Face++. More recent findings (Zhou et al., 2024) show systematic gender and race biases in generative AI outputs. The images generated by these systems reflect significant underrepresentation of women and people of African descent, compared to both actual labour market data and images indexed by Google. For example, Midjourney represents women in only 23% of the images and people of African descent in 9%, compared to U.S. labour market data where women represent 46.8% and black people represent 12.6%. Recent evaluations also show that multilingual large language models like LLaMA 2 and Mistral significantly underperform in low-resource languages such as Igbo, Kazakh and Oriya, due to imbalances in training data imbalances (Li et al., 2024).

Such biases often stem from a lack of transparency and diversity in data sources, especially during the initial training phases that shape the outputs of AI models. A growing concern is the phenomenon of 'model collapse,' where AI systems increasingly trained on synthetic, rather than human-generated content risk losing their ability to generate diverse and high-quality outputs. The proliferation of synthetic content risks further marginalizing already underrepresented cultures and languages.

The *Recommendation on the Ethics of Artificial Intelligence* (UNESCO, 2021) identifies safeguarding cultural diversity as a central ethical imperative, directly relevant to the recognition and protection of cultural data. It calls for integrating diversity, transparency and accountability principles across the entire AI lifecycle, from data collection and annotation to model training, deployment and evaluation. Cultural data must be understood not only as a technical resource, but as a vital carrier of diverse epistemologies and knowledge systems. The Recommendation urges Member States to adopt robust governance frameworks to audit and mitigate biases, ensure datasets are diverse, representative, multilingual and ethically sourced and improve annotation practices. It also advocates for the development of 'gold standard' data repositories, which can serve as secure, high-quality references for culturally inclusive AI systems.

Addressing data poverty is also essential to enhance cultural inclusion in AI systems. Many communities remain underrepresented or not represented at all in AI training data, limiting their visibility in AI applications. Community-led initiatives offer promising models. In

Aotearoa New Zealand, the Papa Reo project of Te Hiku Media supports smaller Indigenous language communities to develop speech recognition and natural language processing tools, safeguarding linguistic data sovereignty and ensuring local benefit (Lee, 2024). In Canada, the Abundant Intelligences initiative works with Indigenous communities to design AI systems aligned with their epistemologies, while building local capacity to access and develop these technologies on their own terms (Abundant Intelligences, n.d.).

In order to ensure cultural diversity in AI systems, governments, policy makers, cultural institutions and technology developers must work collaboratively to establish mechanisms for participatory governance, community-led data practices and algorithmic accountability. This includes creating regulatory environments that require impact assessments on cultural diversity, as well as funding research and innovation in culturally inclusive AI design. Ensuring that AI systems respect and reflect the plurality of worldviews, languages and traditions is central to the protection of cultural rights and the realization of equitable digital futures.

D

Safeguarding Cultural Rights and Redistributing the Value Generated by AI Use of Cultural Data

The widespread deployment of AI systems, particularly those based on large-scale machine learning and generative models, has challenged the adequacy of existing copyright laws to protect the rights of cultural creators. In most jurisdictions, copyright law distinguishes between two core dimensions: moral rights, which ensure proper attribution and protect the integrity of a work and economic rights, which regulate the reproduction, distribution and derivative use of creative content. While moral rights are inalienable and perpetual, economic rights are typically time-bound and transferable.

According to UNESCO's monitoring data, while IP legislation exists in 100% of Global

North Member States and 89% of Global South countries, nearly 45% report difficulties in implementation (BOP, 2024, Indicator 2.1.1.1). These difficulties are increasingly linked to technological developments, including the growing use of AI systems.

A central concern is that many AI systems are trained on vast datasets collected via automated web scraping, often without the knowledge or consent of the creators whose works are used. Since such datasets are rarely disclosed publicly (for example, OpenAI and Midjourney, have not shared details on their training sources), copyright holders are unable to determine whether their work has been used or to seek legal recourse (Guadamuz,

2024). In response, emerging regulatory initiatives have begun to tackle the opacity surrounding AI training data. The European Union's AI Act, through Article 53, mandates the disclosure of training data summaries for general-purpose AI models. Complementing this, the *Recommendation on the Ethics of Artificial Intelligence* (UNESCO, 2021), similarly emphasizes transparency and traceability as fundamental principles, particularly to safeguard intellectual property rights and promote fairness and cultural pluralism in digital systems. Moreover, the G7 *Hiroshima Process International Code of Conduct for Organizations Developing Advanced AI Systems* (2023), in its Action 3 calls on organizations to "publicly report advanced AI systems' capabilities, limitations and domains of appropriate and inappropriate use, to support ensuring sufficient transparency, thereby contributing to increase accountability", also noting that such reports should include "[d]iscussion and assessment of the model's or system's effects and risks to safety and society such as harmful bias, discrimination, threats to protection of privacy or personal data, and effects on fairness".

However, even when datasets contain copyrighted material, legal loopholes remain. Some datasets use only metadata or hyperlinks rather than storing full works, thereby evading direct infringement claims. Legal systems in several jurisdictions, such as the US and the UK, do not provide protection for transitory or partial copies if they have no independent economic value, which is the case of any work included in a large dataset. In addition, many AI models rely on exceptions to copyright, such as use for research or temporary copying, which further complicates enforcement once the resulting models are commercialized.

Importantly, AI models do not keep copies of training data, but only statistical approximations derived from it. Consequently, the model and its generated outputs often fall outside the scope of current copyright law, as they are not considered literal reproductions or derivative works. This illustrates the inadequacy of existing IP regimes to address the particular characteristics of AI systems, while underscoring the need to uphold the rights of artists and cultural and creative industries continue to be fully respected.

In this context, regulatory approaches and technical options could include:
  • Requiring greater transparency in dataset composition and training processes;
  • Developing technical mechanisms to embed creator consent, but also, economic and other conditions for inclusion in training datasets, directly into the metadata of digital cultural goods;
  • Supporting the creation of open, trusted repositories with clearly defined usage rights.

The above considerations primarily concern Explicit Cultural Expressions, for which existing IP frameworks provide at least a partial basis for governance and protection. However, parallel efforts are required to address the governance and safeguarding of Implicit and Latent Cultural Expressions as defined earlier. Although, these forms of cultural data do not originate from deliberate acts of creation, they nonetheless embody collective cultural patterns and generate significant cultural-cognitive and economic value. Their collective, large-scale and non-deliberate nature calls for regulatory approaches that recognize their shared dimension and ensure a fairer redistribution of the economic value they produce.

The *Recommendation on the Ethics of Artificial Intelligence* (UNESCO, 2021) urges Member States to promote fairness and accountability throughout the AI lifecycle, including in relation to data sourcing and benefit-sharing. To operationalize these principles, national and international governance systems must adopt concrete mechanisms, including fiscal measures, such as a targeted AI levy to redistribute economic value back into the culture and creative sectors.

Various proposals offer useful reference points. Automation or robot taxes have been proposed to offset losses from human job displacement when workers are replaced by machines, compensating for potential tax revenue reduction and unemployment (World Economic Forum, 2016; Pastor, 2017; Bastarrica, 2023; Dimitropoulou, 2024). Another approach treats data generated by users of digital technologies as a form of labour that should be economically compensated (Lanier, 2023; Lanier & Weyl, 2018; Arrieta-Ibarra et al., 2018; Vincent and Hecht, 2023). Both approaches have limitations. The former risks discouraging innovation, hindering the productivity gains that AI systems can provide by placing the tax burden on the users. The latter conflates life in digital environments with labour, potentially reducing cultural data to private property

and undermining its collective dimension. It also risks widening technological gaps as the capacity to pay would discriminate its use. Various paths are currently being explored for how AI might relate to the digital commons (Huang and Siddarth, 2023).

Another possible approach could be to tax companies that develop and own AI models. This could serve as a mechanism to compensate for the private appropriation of a common good, especially cultural data in the form of *Implicit and Latent Cultural Expressions.*

Marietje Schaake, former Dutch Member of the European Parliament (2009-2019) argues global corporate tax models could guide how we redistribute AI-generated value. She points to the OECD-led Global Minimum Corporate Tax Rate of 15% as a precedent for establishing coordinated fiscal regimes to ensure fair contributions from global technology firms (Schaake, 2024). Similarly, Dario Amodei, CEO of Anthropic, has proposed the creation of a 'token tax' system. This would require AI companies to contribute a share of revenues each time their models are used, creating a redistributive pool to mitigate societal imbalances exacerbated by AI deployment (The Life Sciences Magazine, 2025).

In considering the possibility of an AI tax, clear criteria, such as model size and provenance of training data, are required. For example, models that can demonstrate lawful acquisition of all training data (by paying for copyrighted works), might be exempt. In contrast, large-scale models drawing on cultural data commons could be subjected to compensation measures.

The purpose of a fiscal instrument would be to compensate for the privatization of a shared cultural heritage. Its design needs to be carefully studied and collaboratively defined by experts across multiple disciplines to assess feasibility, risks and benefits. Nevertheless, there it is an urgent need to explore alternative ways for redistributing the economic value generated by cultural data, which is the product of our digitized cultures. Just as UNESCO has developed operational concepts as the notion of 'world heritage', the digital age urges for new concepts capable of collectively safeguarding culture as it unfolds within digital environments.

E

Conclusions

Artificial intelligence systems rely on vast quantities of cultural data. This includes both explicit cultural expressions, such as artworks, performances and audiovisual content—and more diffuse, non-intentional data that nonetheless reflect shared social practices, values and worldviews. Explicit cultural expressions are generally covered by existing intellectual property frameworks. Yet their systematic use in AI training highlights the need for greater transparency, fair attribution and equitable benefit-sharing. Equally, creators must be granted meaningful access to AI systems and infrastructures to ensure that their participation in digital innovation is not limited by structural inequalities.

However, much of the cultural data fuelling AI systems today belongs to the category of implicit or latent cultural expressions. These are not produced with the deliberate intention of being cultural works, yet they carry a collective cultural significance similar to forms of intangible cultural heritage. Recognizing their cultural value, within the broader dual nature of cultural data as both economic and cultural, is critical for understanding the foundations of contemporary artificial cognition. This recognition must highlight the cognitive value embedded in these data, which forms a key part of culture in digital environments. Acknowledging the cognitive value of cultural data creates opportunities to design

new fiscal approaches aimed at a more equitable redistribution of AI-generated benefits, ensuring that private use of shared cultural patterns is balanced by collective returns.

Affirming the cognitive value of cultural data is not only a matter of conceptual advancement; it is also a matter of rights. It provides a basis for protecting and promoting cultural rights in the digital age; rights that include access, participation and benefit-sharing in cultural life. In an era where digital technologies mediate cultural expression, memory and access, safeguarding cultural rights requires new frameworks capable of addressing both the explicit and latent dimensions. Doing so will be central to ensuring that the benefits of AI are shared fairly and that culture continues to be recognized as a public good in the digital age.

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IV. THE IMPACT OF AI ON CULTURAL VALUE CHAINS IN THE CREATIVE ECONOMY

AI has evolved beyond a mere assistant to play an active part in the creative process, producing increasingly sophisticated content across text, audio, visual and multimodal formats. This shift challenges long-established cultural frameworks that have governed creative practice and the creative economy for generations. As algorithmic systems become embedded in cultural production, urgent questions arise around ownership, authorship and creative agency.

The implications reach deep into the structure of the cultural and creative industries. AI is reshaping the creative economy's entire value chain: from initial creation and production to distribution, access and audience engagement. In doing so, it redefines established notions of originality and necessitates new standard of algorithmic transparency and accountability.

It should be noted that addressing the challenges of what might be termed 'Cultural and creative industries 4.0' requires more than regulatory intervention. At the heart of this transformation lies a fundamental tension: how to balance the scalability and efficiency enabled by AI with the preservation of human creativity and the inclusion of diverse cultural voices. This trade-off, between automation and agency, permeates the AI-driven creative economy and constitutes the core concern of this section.

A

Problematization

High-profile controversies, alongside the explosive growth of AI-generated content on platforms like Amazon (HEC Paris, 2025) and mounting evidence of unresolved copyright conflicts, crystallize the urgent practical and ethical dilemmas facing creators and cultural industries today. The explosive growth of AI-generated books on Amazon, evidenced by platform policy changes (e.g., a 3-book/day limit by author) and widespread reports of impersonation, crystallizes the urgent ethical and economic dilemmas facing creators.

Equally pressing is the need to understand how AI is reshaping patterns of cultural consumption and discovery. Algorithmic curation systems do more than distributing existing content: they actively shape cultural preferences, often creating feedback loops that reinforce dominant aesthetic norms and reduce the diversity of cultural expressions. This shift from human to algorithmic gatekeeping raises fundamental concerns about cultural sovereignty, pluralism and the democratization of creative discoverability.

It is critical to recognize that AI functions not as a neutral tool but as an epistemic infrastructure - what scholars Pasquinelli and Joler (2021) term a 'Nooscope'- embedding historical biases and structural power asymmetries into cultural knowledge systems. If left unchecked,

these systems risk amplify dominant narratives while further marginalizing underrepresented voices, particularly from the Global South and minority-language communities.

Navigating this rapidly evolving landscape requires a nuanced and interdisciplinary approach, one that balances technological innovation with cultural responsibility.

B

UNESCO's pioneering role in promoting equity in the AI-transformed creative economy

UNESCO has played an active role in examining and supporting discussions on the evolving relationship between AI, digital technologies and the creative economy. Leveraging its unique mandate to safeguard and promote cultural diversity, UNESCO has developed key normative frameworks and policy guidance for navigating the ongoing technological transformation.

As detailed in Section I , its pioneering work was anchored with the 2017 *Operational Guidelines for the Implementation of the 2005 Convention in the Digital Environment,* which laid foundational principles for all cultural stakeholders, across technologies, disciplines and stages of the value chain. This was followed by the landmark *2018 Global Report: Re|Shaping Cultural Policies,* which reconceptualized the creative value chain as a dynamic network, positioned data at the core of cultural policy and explicitly identified AI as a transformative agent in content generation.

Figure 1. The cultural value chain in the digital environment: from a 'pipeline' configuration to a network model
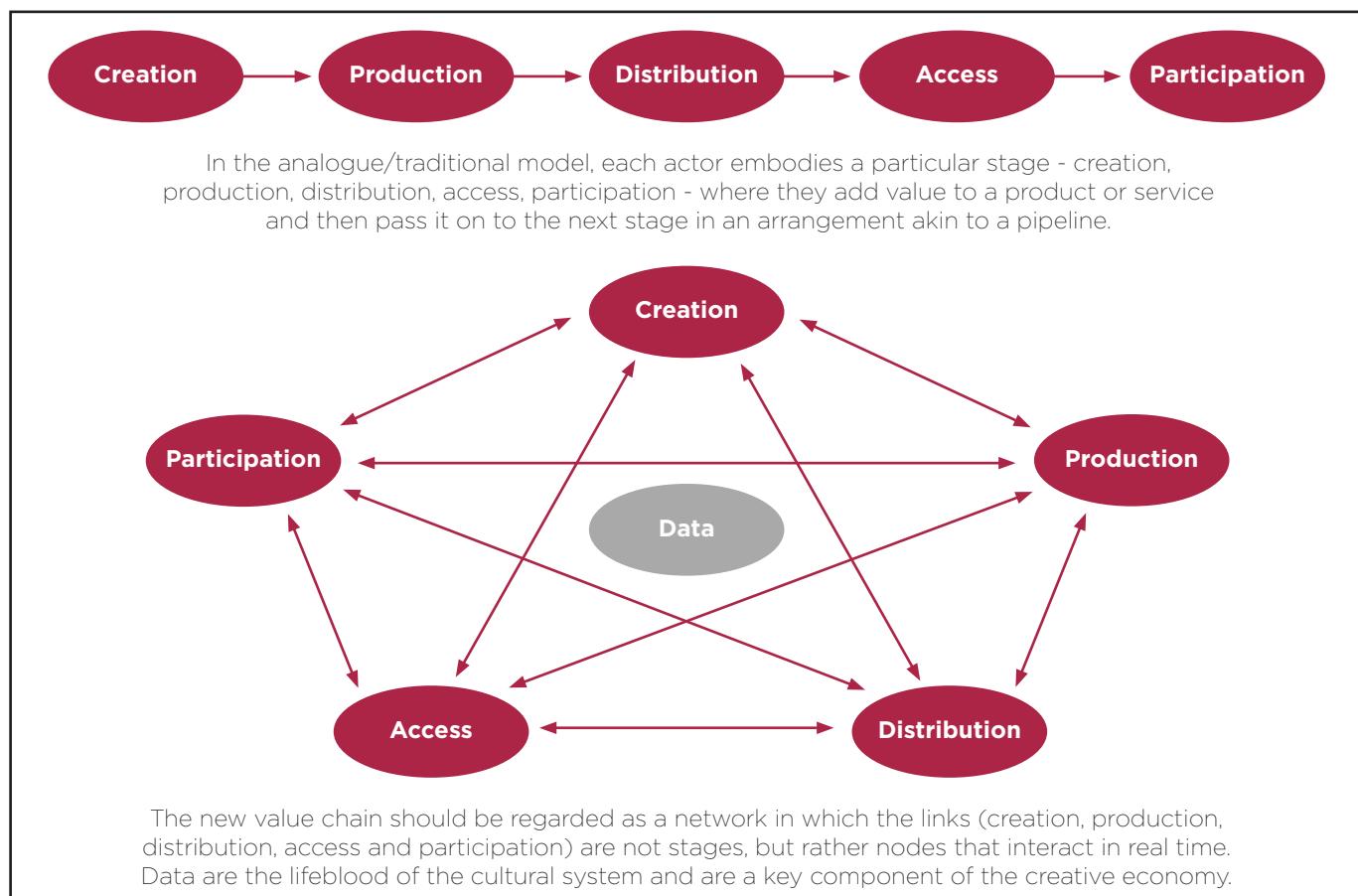
Source: RE | SHAPING CULTURAL POLICIES. Advancing creativity for development: 2005 Convention Global Report 2018, UNESCO, Paris, 2017, p. 76.

In response to the ethical implications posed by AI, all 194 UNESCO Member States adopted the first global normative instrument on the subject: the *Recommendation on the Ethics of Artificial Intelligence* (UNESCO, 2021). This landmark document provides essential ethical principles, advocates for creators' rights in the AI context, underscores the need for capacity-building in the cultural and creative industries and calls for enhanced online discoverability of diverse, particularly local and underrepresented, content. Such call has been reiterated within multilateral fora, including in the *Salvador da Bahia Declaration* of the G20 Ministers of Culture (2024).

UNESCO has continued to build on this foundation and subsequent reports have deepened the focus on economic sustainability. The *2022 Global Report* strongly warned about the risks of economic concentration driven by digital platforms and AI systems. Most recently, the 2024 *Recommendations of the Reflection Group on the Diversity of Cultural Expressions in the Digital Environment* explicitly call for urgent action, advocating for the implementation of targeted national capacity-building plans designed to equip the cultural sectors for the digital and AI era, alongside other essential equity-focused initiatives.

Taken together, this trajectory reflects UNESCO's ongoing commitment to ensuring that technological advancements, particularly AI, foster a creative ecosystem that is innovative, equitable, diverse and sustainable.

C

AI's disruptive impact across the creative value chain: opportunities and challenges

Generative AI is fundamentally reconfiguring the creative value chain, a transformation anticipated by UNESCO's 2018 networked-chain model and now analysed by the World Economic Forum through four disruptive vectors:

- Hyper-personalized creation dissolving boundaries between artist and tool;
- Dynamic production scaling compressing timelines by 50–70%;
- Algorithmic gatekeeping concentrating 90% of visibility in platform hands;
- Automated cultural arbitrage prioritizing data-optimized content over culturally significant works.

This efficiency-driven restructuring is projected to generate $1.2T in market value by 2025 (WEF, 2024). Yet it involves a high concentration of supply of cultural content, data, markets and income in the hands of only a few actors, with potential negative implications for the diversity and pluralism of languages, media, cultural expressions, participation and equality.

To better understand these dynamics, the following two subsections examine, first, the transformations of the creative value chain across creation, production, distribution and access, and second, the wider economic and social challenges arising from these shifts.

1. THE NEW CREATIVE LANDSCAPE: THREE PHASES OF TRANSFORMATION

Creation: Democratization amid growing disparities

The creative process is undergoing radical transformation. AI as a co-creation tool is enabling both artists and non-artists to prototype ideas with unprecedent speed, potentially democratizing creative expression for those without traditional technical training. Musicians can now compose, filmmakers can generate sophisticated visual effects and writers can explore narrative possibilities across multiple modalities with unprecedented ease. In theory, this development lowers barriers to entry and democratizes artistic expression.

However, this democratization enabled by AI comes with profound structural asymmetries. The foundational models underpinning these AI systems are often trained on vast datasets that include unlicensed creative works, raising critical concerns about creator rights and fair compensation. These issues are foregrounded in key policy documents such as UNESCO's *Recommendation on the Ethics of AI* (2021), the EU AI Act (2024) and the *South Korean AI Basic Act* (2025). While some platforms have begun to establish licensing agreements with major rights holders, individual artists are frequently excluded from such arrangements.

In particular, artists and cultural professionals in the Global South face compounded barriers to accessing AI tools, including the high cost of hardware, subscription fees and digital literacy gaps. Combined with other structural limitations such as limited broadband access, language gaps in AI interfaces and underrepresentation in training data, these barriers deepen the unequal distribution of AI-enabled creative opportunities.

The question of authorship becomes increasingly complex as AI systems contribute more substantially to the creative process. As Hazucha (2022) observes in her analysis of artificial intelligence and copyright law, existing legal frameworks struggle to keep pace with technological advancement, creating uncertainty for creators regarding their rights and ownership in human-AI collaborative works. According to the 2023 *WIPO Global Intellectual Property Indicators,* only 12% of countries have updated their copyright legislation to address issues related to AI-generated content.

Production and distribution: Efficiency and consolidation

The production phase reveals most clearly the dual nature of AI's impact on the creative sector. Automation of 30-50% of repetitive tasks, ranging from video editing to content localization, has the potential to free human creators from routine labour, allowing them to focus on higher-order creative decisions and narrative development. This enhanced efficiency enables smaller creative teams to produce content at scales previously reserved for major studios and has the potential to level the playing field across the industry.

However, these gains are not evenly distributed. Empirical research published in *PMC* (2022)

demonstrates that AI adoption significantly improves cultural industries' global value chain positions in high-income countries, while having negligible impact in low and middle-income nations, thereby exacerbating existing disparities in creative capacities and widening the digital divide.

This technological transformation is also accelerating job displacement in traditional creative roles. According to the *UK Parliament's POST* briefing on AI in creative industries (Houses of Parliament, 2024), up to 40% of roles, including writers, translators, publishers, graphic artists, composers, mixers, may be rendered redundant by 2030 as AI systems increasingly take over core functions. The concentration of AI development in the hands of major technology companies further exacerbates these concerns.

Perhaps most critically, as mentioned above, algorithmic curation is reshaping the distribution landscape and how content reaches audiences. While these systems can assist niche creators find their audiences, they also reinforce winner-takes-all dynamics where a small percentage of creators capture the majority of attention and revenue. For instance, a 2023 study published in the *Journal of Business Information Systems* analysed visibility distribution across YouTube, Instagram and TikTok and found that the top 1% of creators capture 90% of algorithmic visibility.

Access and cultural participation: Abundance vs homogenization

While AI enables unprecedented, personalized access to cultural content through recommendation systems, this customisation often masks a deeper trend towards systemic homogenization. Algorithms optimize for engagement by promoting content that align with users' established preferences, creating personalized 'filter bubbles' that paradoxically narrow, rather than expand, collective cultural exposure. What appears as choice is often a closed loop of algorithmically enforced familiarity. True cultural diversity requires policies that counterbalance engagement metrics with cultural pluralism principles. This could involve policies such as mandated 'discovery quotas' for local and underrepresented content, as well as audits of algorithmic bias in recommendation systems.

The widespread use of similar training datasets across AI systems risks fostering a cultural monoculture, where stylistic diversity is replaced by algorithmic uniformity. This issue is especially pressing when considering the representation of non-Western cultural traditions, which remain underrepresented or misrepresented in the data used to train these systems.

At the same time, the proliferation of AI-generated content also raises questions about cultural quality and authenticity. For instance, the increase of AI-authored books on Amazon (HEC Paris, 2024) illustrates the scale of this phenomenon. As platforms become saturated with machine-produced content, it becomes increasingly difficult to distinguish genuine meaningful cultural expression from content generated by algorithms.

2. ECONOMIC AND SOCIAL CHALLENGES

The economic impact of this AI-driven transformation extends far beyond individual creators. Independent artists and small creative enterprises find their market share diminishing as platform-mediated distribution favours content optimized for algorithmic promotion, often at the expense of originality and diversity.

This algorithmic bias threatens the economic foundations that have historically supported varied creative ecosystems.

The global nature of AI development adds further complexity. While *Allied Market Research* (2024) projects the creative AI market to grow from $1.7 billion in 2022 to $21.6 billion by 2032 (a 29.6% compound annual growth rate), the benefits of this expansion remain concentrated in regions with advanced technological infrastructure. This uneven distribution risks reinforcing and creating new forms of cultural dependency, where creative communities in less technologically developed regions rely on tools and platforms developed primarily in distant, centralized innovation hubs.

Addressing these challenges requires a comprehensive approach that recognizes both the transformative potential and inherent risks of AI in cultural production. Building on frameworks such as UNESCO's 2024 *Recommendations of the Reflection Group on Diversity of Cultural Expressions,* effective governance must move beyond traditional regulatory frameworks to encompass investment in digital infrastructure, mechanisms for cultural preservation and economic equity.

D

Alternative economic models: Supporting diversity and independence

The integration of artificial intelligence into the creative industries presents both unprecedented opportunities while posing fundamental challenges to cultural sovereignty. As UNESCO's 2018 and 2022 *Global Reports* propose, the digital transformation of cultural production requires governance frameworks anchored in three essential pillars: transparency, participatory design and accountability. These principles should guide member states in developing policies that safeguard pluralistic expression while harnessing AI's potential for creative innovation.

The imperative extends beyond technological adoption to fundamental questions of cultural equity and creative agency. Without deliberate intervention, AI systems risk perpetuating what has been called 'algorithmic colonialism', the extraction of cultural capital coupled with the marginalization of underrepresented voices and creative traditions. A sustainable path forward demands economic architectures that prioritize cultural sovereignty over extractive scalability; investment in equitable access to AI tools and training; the development of attribution mechanisms that fairly compensate creators whose works train AI models; and the implementation of cultural safeguards that preserve and promote diverse creative traditions.

Public cultural institutions, including national libraries, museums, broadcasters and arts centres, serve as indispensable infrastructural counterweights within AI-mediated creative ecosystems. As custodians of cultural memory and trusted public intermediaries, they are uniquely positioned to undertake critical governance functions. These institutions must evolve from repositories to 'algorithmic stewards', providing the institutional scaffolding needed to translate normative frameworks into equitable creative praxis.

Here are four areas of recommendations to implement:

1. EMPOWERING CREATIVE COMMUNITIES: RIGHTS, RECOGNITION AND AGENCY

Training & Inclusion
- Establish national AI-artist residencies and workshop programmes, to build critical technical fluency among creative communities
- Ensure the participation of creators in AI regulatory bodies representing the different links in the value chain of the different professions

Equitable compensation
- Adopt opt-in collective licensing frameworks for training data, rejecting blanket fair use exemptions (such as those facilitating style replication)
- Implement royalty distribution systems for creators whose work contributes to AI training datasets
- Establish creator compensation funds financed through AI platform revenues

Protection of artistic style
- Encourage the World Intellectual Property Organization (WIPO) and other fora devoted to Intellectual Propriety to address the challenge of legally recognizing artistic style as protectable subject matter where AI outputs directly compete with human creators
- Establish legal procedures for bringing and adjudicating style-infringement claims against AI-generated content

2. STRENGTHENING LOCAL CREATIVE INDUSTRIES

Supporting small & medium enterprises
- Co-fund regional AI laboratories working with ethically sourced data
- Launch public AI infrastructure to reduce computational barriers for creators, particularly in developing regions
- Provide technical support and training for small cultural enterprises integrating AI tools

Fostering Industry-Academia partnerships
- Fund longitudinal studies on AI's labour market effects across creative sectors
- Advocate for periodic cultural impact assessments by AI platforms
- Create publicly accessible databases and support new research to track AI's effects on creative employment

Industry-Technology bridges
- Scale accelerator programmes linking traditional creative studios with AI developers
- Establish cross-sector working groups to develop and maintain ethical AI deployment standards

3. DEMOCRATIZING ACCESS: ALGORITHMIC PLURALISM AND LITERACY

Algorithmic diversity quotas
- Recommend platforms to allocate a minimum share of recommendation visibility to local and independent content
- Implement geographic, cultural and linguistic diversity requirements for AI training datasets
- Call for algorithmic transparency reports detailing content promotion mechanisms

Synthetic content labelling
- Legally enforce watermarking and clear identification of AI-generated creative works
- Institute penalties for platforms that fail to implement adequate labelling systems
- Establish globally interoperable labelling frameworks, requiring platforms to embed verifiable disclosure mechanisms (including training data sources and algorithmic parameters) in AI-generated content

Citizen empowerment
- Integrate AI literacy into national education curricula while considering formal, non-formal and informal learning settings
- Develop public auditing tools enabling

creators to track their content's use in AI training
- Establish citizen advisory panels to inform AI policy development in cultural sectors

4. INTERNATIONAL COOPERATION

To shift AI from an extractive tool to a means of supporting cultural diversity, effective transnational coordination must establish aligned policy instruments across countries. The algorithmic transformation of cultural creation necessitates a global governance that transcends fragmented national approaches and embraces systemic, cooperative frameworks.

In this context, organizations such as UNESCO, WIPO and regional regulatory bodies play critical roles as guarantors of three interrelated imperatives:

1. Ethical harmonization of standards: Multilateral bodies can bring together diverse voices to foster AI systems' alignment with foundational principles:
- Integrity of the cultural value chain
- Protection of creators' moral and economic rights
- Safeguarding diversity as a non-commercial common good

2. Regulatory interoperability: Interoperability between national and regional legal frameworks is essential to prevent regulatory fragmentation and block the emergence of 'algorithmic havens'.
This requires:
- Leveraging WIPO's legal infrastructures to ensure traceability of creative works and facilitate equitable remuneration mechanisms
- Adopting regional regulatory templates (e.g., EU AI Act) as enforceable benchmarks

3. Promoting Cultural sovereignty through South-South solidarity: Transferring and strengthening governance models among Global South nations to foster:
- Context-specific adaptation of ethical innovations, including digital commons governance and community-based licensing
- Resistance to data extractivism through endogenous technological alternatives
- Rebalancing North-South asymmetries in standard-setting

Such cooperation reorients AI from a disruptive force into a lever for cultural resilience, enabling the preservation of distinctive creative ecosystems while fostering collective responses to shared technological challenges. Transitioning from extractive to regenerative creative economies requires centring human intentionality in the design and deployment of AI systems. Achieving this shift requires sustained and coordinated action across legal, economic and technological domains to preserve creative sovereignty in the algorithmic age, both nationally and internationally.

E

Conclusions

The profound transformation of creative industries through AI represents more than technological evolution: it constitutes a fundamental restructuring of cultural production that demands comprehensive governance frameworks. As the analysis demonstrates, AI's integration across the entire creative value chain, from initial conception to public dissemination, generates complex interconnected challenges that cannot be effectively addressed through fragmented or siloed regulatory interventions.

The evidence reveals three interlinked risks facing global creative ecosystems: 1. economic dependency on platform-controlled AI systems, 2. algorithmic homogenization that compresses diverse creative practices into efficiency-optimized templates and 3. cultural extraction that appropriates creative capital without equitable compensation. These challenges transcend traditional policy boundaries, requiring integrated approaches that link copyright frameworks with competition policy and protections for the creative economy's diversity and resilience.

The path forward demands recognition that AI's highest value lies in augmenting rather than replacing human creative agency. Successful governance must prioritize guardrails against extraction through enforceable data licensing systems, sovereign infrastructure development including public computational resources and South-South partnerships and algorithmic pluralism through diversity requirements and transparency mandates.

This moment presents a defining choice: whether artificial intelligence will amplify humanity's rich cultural diversity or silence marginalized voices through technological homogenization. Coordinated action anchored in UNESCO's principles of transparency, inclusion and accountability is essential to ensure that technological advancement expands rather than constricts the possibilities for human creative expression.

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V. CULTURAL EDUCATION IN THE AI ERA: TRAINING THE TALENTS OF TOMORROW

Cultural education in the age of AI faces the need of linking creativity to technical competence. Educating future talents relies on striking the right balance: human creativity needs to remain essential and it must be complemented with the development of AI literacy as well as an informed understanding of the evolving cultural landscape (Bunz et al. 2022). Both learners and educators need to develop technical and creative AI competencies to understand how AI technologies can support, reshape and challenge their discipline. This is especially critical in light of concerns about deskilling, particularly due to overreliance on automation or generative AI tools. As AI becomes part of the creative learning process, partnerships between educational and cultural institutions with technology companies will strengthen their impact on individuals, communities and societies. These partnerships will differ across regions, encompassing local startups, multinational tech corporations, open-source community and non-governmental organizations (NGOs). Engaging with technical expertise and tools by collaborating with big and small tech could advance creativity, as art and creative practice has always also been technical. While there may be shared foundational AI competencies, their application will differ across creative domains such as the Visual Arts, Performing Arts, Literary Arts, Music, Movies, Games and Entertainment, Design, Architecture and other Creative Industries. The following section focuses on educational and training needs across these fields, drawing on the UNESCO Framework for Culture and Arts Education (2024) which calls for culture and arts education to broaden access to digital technologies, including AI, in order to strengthen the knowledge and awareness of both the opportunities and risks of this technology.

A

Integrating AI competence into artistic curricula

In recent years, advances in AI have extended its use into many aspects of creative production and administration, making AI competence an essential part of students' education and teachers' training. Art universities and academies worldwide are increasingly integrating AI into curricula that span disciplines from traditional fine arts to cutting-edge media arts. These incorporations carry with them distinctive pedagogical, social, cultural and economic implications, as evidenced by recent pilot projects and qualitative studies. One such study conducted in Latvia (Ansone et al., 2025) involved ten undergraduate art students learning the foundational principles of composition, balance, contrast, unity and emphasis, through both traditional and AI-enhanced methods. Initially, students completed a manual composition task using basic forms. In a subsequent phase, they were introduced to a generative AI tool and tasked with translating their artistic intentions into precise text-based prompts. The study found that while AI was not a precise design instrument, it served as a valuable conceptual partner, functioning more as an inspirational mentor than as a deterministic tool.

A variety of educational initiatives around the world have begun exploring how best to integrate AI into creative curricula and are presented below:

In the United States of America, art school classes include teaching about, reflection upon and practice with AI. For example the Ringling College of Art and Design in Florida[3] addresses the challenges posed by AI through a creativity-centred approach, offering training in both ethics and artistic experimentation. Similarly, the Rhode Island School of Design offers courses[4] in Generative AI and AI and the future of literary writing and as provides guidance on how to incorporate AI-related content into a syllabus. Additional examples include the Massachusetts Institute of Technology (MIT) and New York University (NYU). MIT is known for its Media Lab and forward-thinking arts technology programmes and offers courses and research opportunities that fuse art, design and AI[5]. Students can take classes on creative machine learning, computational design and AI-assisted art-making and build AI-driven interactive installations. At NYU, the Tisch School of the Arts hosts the Interactive Telecommunications Programme (ITP), which brings together students from diverse disciplines, such as the arts and computer science, to explore emerging technologies including machine learning[6]. Students may use for example natural language processing to create chatbot-based theatre pieces or employ generative adversarial networks (GANs) to generate visual artworks.

In Europe, similar projects and courses can be found, for example, at the *Royal College of Art London,* the *Creative Computing Institute of the University of Arts London,* the Interface Cultures programme at *Linz University of Arts in Austria or the Media Arts and Design programme at Aalborg University,* Denmark. At the same time, several studies pave the way to appropriately incorporating AI in teaching-learning processes. In Spain, Multimedia Communication students together with students of the Audiovisual Communication and Advertising Department were part of a focus group analysis (Sáez-Velasco et al. 2024). As a point of departure for their discussion, students were shown a series of AI generated images. The conversation evolved and led them to contemplate questions of creativity and training of future artists and AI ethics as well as the cost and efficiency of AI. The study found that AI integration in arts education, should prioritize knowledge acquisition and skill development over immediate output.

In Asia, having integrated AI into research, many academies are beginning to extend its use into education. China established in 2024 its first *Artificial Intelligence Art Institute at the Tianjin Academy of Fine Arts*, facilitating collaboration between artists, computer scientists and industry partners. In Taiwan, 46 students of an elective art course, all beginners without any prior knowledge of art and design, tested a deep learning AI tool that helped them identify and classify artworks and allowed them to observe features of artworks from a new perspective. The study (Chiu et al. 2022) found that the usage of the tool improved their learning, as the comparison with the control group showed. Taiwan's *Graduate Institute of Digital Learning and Education at Taiwan Tech* likewise teaches 'Non-Technical Introduction to AI Drawing' as it aims to teach students 'Arts Styles of the Future'.

In Africa, formal programmes dedicated to AI in art are also developing. Leading here is the *University of Education*, Winneba (UEW) in Ghana, which among other experiments tested AI tools in their drawing course[7]. Nigeria has also embraced an AI-Driven Education and many Nigerian artists are open towards experimenting with AI such as the Nigerian filmmaker, artist and creative technologist Malik Afegbua.

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[3] https://www.ringling.edu/academics/campus-resources/ai/
[4] https://teachingandlearninglab.risd.edu/teaching-support/tech/ai
[5] https://www.media.mit.edu/projects/creative-ai-a-curriculum-around-creativity-generative-ai-and-ethics/overview/
[6] https://itp.nyu.edu/itp/
[7] https://explore-vc.org/en/galleries/subgalleries/ai-ghana.html

In Latin America, art and design students experiment with AI tools as well as they produce critical work regarding the AI ecosystem. In Bolivia, the school of arts of a private university invited students to test various AI tools (Grájeda et al. 2024). The initiative was followed by an evaluation of student perceptions regarding those AI-enhanced classes in comparison to traditional lectures. Findings indicated that students generally responded positively to the integration of AI, noting improvements in creativity, engagement and learning outcomes. In Chile, the School of Design at the Pontificia Universidad Católica de Chile is the host of the research programme 'Futures of Artificial Intelligence Research' that critically evaluates the AI ecosystem and offers students lectures about a design for 'More-Than-Human Futures.'

In Oceania, universities are testing collaborations of art and AI in a range of labs. *The Sia Furler Institute of Contemporary Music and Media at the University of Adelaide* paired for example AI engineers of the Australian Institute for Machine Learning (AIML) with contemporary Artists such as Lauria Anderson. The *Art Science Lab* at the *MARCS Institute for Brain, Behaviour and Development Western Sydney University* provides artists with equipped and affordable creator spaces and technologies. Meanwhile in Aotearoa-New Zealand, Maori and Pasifika scholars, elders and master craftspeople have come together to debate how they would like to link their culture to and work in their culture with AI technologies thereby keeping Moana Oceania's traditions of making, knowing and relating (Lythberg et al. 2025).

Building on these and other experiments with AI, the following aspects emerge as essential to advancing culture and arts education in formal, non-formal and informal settings:
- **Technical literacy:** Students must develop a foundational understanding of how AI models operate within their artistic disciplines. This includes technical literacy regarding generative AI, the processes behind its training, the data influencing its outputs and its inherent potential for algorithmic bias. Additionally, students should be able to assess the practical utility of AI in supporting different administrative tasks that are integral to an artistic career including applications processes to financial planning.
- **Practical AI experience:** Beyond theoretical knowledge, students need to gain hands-on experience with AI tools. This entails understanding how training data shapes AI models, getting an overview over existing creative AI tools and learning the application of these tools, in particular how to employ them in ways that complement, support and amplify human creativity.
- **Leveraging partnerships:** Collaborations between a range of partners, from local startups to BigTech, open-source community and NGOs, can provide varied entry points into the AI ecosystem for creative and cultural fields. Startups foster regionally grounded experimentation and agility, while Big Tech provides scalability and access to advanced tools. Similar to earlier initiatives such as Intel's AI for Youth, which engaged schools in diverse regions from Poland to India to Thailand, these efforts teach students how to evaluate and use a wide range of AI tools. Meanwhile, partnerships with open source and NGO emphasize ethics, accessibility and community-driven development. Together, these collaborations can enrich the technical knowledge base and ensure that creative AI applications remain both innovative and socially responsible, provided they are guided by ethical frameworks.

B

Developing hybrid skills and transdisciplinary fluencies for cultural professions

Cultural and creative professions have long seen the need to develop hybrid skills. An interdisciplinary mindset, characterised by curiosity about technological competencies, not only supports their creative work but also enhances their professional adaptability. This includes integrating AI into both creative and administrative processes, as well as its application in fostering audience interactions and promoting public understanding of AI through experiential engagement with technology-enabled cultural creations.

The following points are particularly relevant:

- **Linking culture, art and tech:** The intersection of traditional cultural knowledge with AI practices leads to new hybrid skills which rely on an interdisciplinary mindset that is curious about technology and driven by creativity. Cultural professionals equipped with these hybrid competencies can leverage technology for their artistic insight, effectively merging computational thinking with aesthetic sensibilities. This approach encourages experimentation and a deepened understanding of both artistic narratives and technological capabilities. As a result, professionals become fluent in both traditional mediums and advanced digital tools, positioning themselves to produce innovative, compelling and culturally relevant works.

- **Harnessing AI to support creativity and foster curiosity:** Cultural professions need to develop robust digital skills including advanced digital literacy and engagement with AI technologies. This entails technical proficiency in using AI-tools, an openness towards the rapidly changing technological capabilities of AI as well as analytical skills to assess AI's ethical, legal and potential cultural implications. Educational and training initiatives should address, engage with and invite art students and cultural professionals to playfully experiment with AI in their artistic practice through dynamic training programmes. This should encourage experimentation, collaboration and critical reflection to actively shape AI's integration into creative practices.

- **Applying AI to streamline administrative processes:** AI can significantly support artists and cultural professionals by automating routine administrative tasks, thereby freeing them to focus on their creative pursuits. Tasks such as pricing artworks, identifying appropriate residencies, preparing awards applications and responding to calls for artists or gallery opportunities can be optimised through AI-assisted tools. By simplifying these often burdensome operational responsibilities, AI enhances efficiency and support career development within the cultural sector.

- **Enhancing audience critical engagement:** AI technologies also enable new modes of public engagement. By incorporating AI into cultural production, cultural professionals can invite audiences to participate in or reflect upon technology-driven creative processes. Educating the general public about AI by allowing them to understand or even interact with a creative process that worked with AI is a unique possibility to foster AI literacy. Audiences can actively engage with cultural content thereby gaining valuable insights into AI, its implications and its creative potentials, thus bridging the gap between cultural literacy and technological fluency educating the public.

- **Adapting to change with continuous learning:** As AI technologies and with it, AI-supported creative tools are evolving, the process of artistic creation and administration is one of lifelong learning. This has become necessary to support creative production in a landscape shaped by digital development including that of AI. Informative courses should allow creative professionals to acquire

knowledge about how to integrate new tools, practices and methodologies quickly, including insights on evolving ethical and legal issues. Learning about AI tools that support the creative process can at times also be found outside classic art educational organizations; for example the AI Expo Africa 2025 that will be held in Johannesburg in October offers a range of workshops that are informative and relevant for creatives.

- **Recognising the potential downsides of AI:** Creatives should be aware about the concern that certain uses of AI are in danger of weakening creative and cognitive capacities. The risk of eroding critical thinking skills increases with higher confidence in GenAI; i.e., as users trust the tools, "you deprive the user of the routine opportunities to practice their judgement and strengthen their cognitive musculature, leaving them atrophied and unprepared when the exceptions do arise" (Lee et al. 2025, 1). By reducing practice, GenAI could pose a danger of debilitating human cognitive skills, notably writing skills, which encompasses drawing inferences, evaluations and relationships between concepts (Heersmink 2024). In particular, the use of large language models for creative tasks can also deter creative performance when users work without assistance (Kumar et al. 2025).

Therefore, while AI's contribution to cultural and creative professions is manifold, an overdependence on AI systems can hinder and weaken creativity and critical thinking. Encouraging hybrid skills that enable practitioners to leverage AI, while sustaining independent thinking, is a challenging yet crucial endeavour in formal and informal education systems.

C

Museums & Cultural Institutions: Sowing the seeds of AI

Museums and other cultural institutions play a vital role in fostering public engagement with AI. Key areas of impact include:

- **Introducing AI Literacy:** Museums, libraries and other cultural institutions are uniquely positioned to cultivate AI literacy among the general public. Through hands-on experimentation, visitors gain practical insights into how AI systems function, their potential for creativity, as well as the societal and ethical questions they raise. These institutions ensure a wider, equitable access and often contextualize AI within familiar cultural narratives, making abstract technological ideas tangible, relevant and relatable. While this is important for the general public, it is especially urgent for underserved or digitally excluded communities, for which museums with their expertise in creating accessible learning opportunities play the key role.

- **Awakening curiosity:** Encountering AI in cultural contexts is an excellent way for raising interest and curiosity of future creative talents as it allows to introduce the dynamic intersection between culture and technology. By showcasing AI through exhibitions, performances and interactive installations, cultural institutions can inspire imaginative exploration, spark new artistic ambitions and encourage young audiences to envision creative futures shaped by both heritage and innovation.

The emergence of AI also poses significant challenges for museums. While AI can enhance collection management, preventive conservation and visitor experiences, it also raises questions about the authenticity of cultural expressions. Generative algorithms, for example, pose a broader risk to culture by blurring the line between what is human-made and what is artificial, potentially undermining trust in shared narratives and collective memory. For museums, this challenge is particularly acute, as their credibility fundamentally depends on the authenticity and integrity of the works and stories they safeguard. Any doubt cast on the fidelity of an object or the interpretation provided could compromise the institution's legitimacy. Additional concerns include algorithmic biases that may marginalize certain heritages, reliance on external technology providers, unauthorized use of cultural content and impacts on specialized cultural employment. In this context, artificial intelligence must be approached not only as a tool for innovation but also as an ethical responsibility, requiring careful governance to ensure that museums and cultural institutions continue to fulfil their essential mission of preserving, interpreting and transmitting humanity's shared cultural heritage.

Successful exhibitions such as '*AI: More Than Human*' at the Barbican Centre (2019) in the United Kingdom, later updated and presented under the title *'AI: Artificial Intelligence'* at the CCCB in Barcelona (2023), Spain in 2024; as well as *'AI: Mind the Gap'* at the MIT Museum (2024) and 'Exploring *AI: Making the Invisible Visible*' at the Museum of Science in Boston (n.d.) exemplify how cultural institutions can play a vital role in fostering AI literacy and public engagement. These exhibitions demystified artificial intelligence by integrating interactive experiences, ethical questions and artistic interpretations. They made AI both accessible and thought-provoking. As cultural institutions such as Boston's Museum of Science attracts over 1.5 million visitors annually, commitment to embedding AI within cultural narratives allows a broad and diverse audience to explore the societal and creative dimensions of this transformative technology.

The UNESCO (2025) Museum of Stolen Cultural Property, opened during MONDIACULT 2025, utilizes 3D, virtual reality and AI technologies for reconstructions and modeling of stolen cultural property. The museum displays missing cultural artifacts currently being sought, providing the public with information on their historical significance, including community testimonials. It serves as an educational tool to raise awareness about the scope of the illicit trafficking of cultural property and the importance of cultural heritage protection.

D

Conclusions

As AI technologies continue to evolve, so too must the educational strategies that prepare creative and cultural professionals for a digitally shaped future. The examples and initiatives presented here demonstrate a growing global recognition of the need to combine artistic, cultural and technological literacies. Embedding AI in cultural education requires practical training, interdisciplinary thinking and, notably, ethical sensitivity along with critical reflection to discriminate the necessary conditions for using AI tools. From art academies and cultural institutions to cross-sector partnerships, the shift toward hybrid competencies reflects a broader transformation of creative practice itself.

AI has the potential to expand artistic expression, democratize creative tools and deepen cultural participation by enriching lifelong learning in and through culture and arts education in all educational levels and modalities. Yet it also poses challenges to originality, authorship and cognitive independence. In response, cultural and arts education must foster both curiosity and caution, foster appreciation of and respect

for cultural diversity, encouraging students and professionals to embrace the creative opportunities AI offers while developing the critical capacity to question its implications. By doing so, educational systems and cultural institutions can ensure that AI becomes not merely a tool of efficiency, but a medium through which future cultural imaginaries can be envisioned.

Finally, artificial intelligence also poses a challenge for museums, which rely on the authenticity of the works and narratives they preserve. Its indiscriminate use can raise doubts about the fidelity of objects, introduce biases in the representation of heritage and create risks for specialized employment. Therefore, its implementation requires an ethical approach and careful governance to ensure that museums continue to fulfil their mission of preserving, interpreting and transmitting shared cultural heritage.
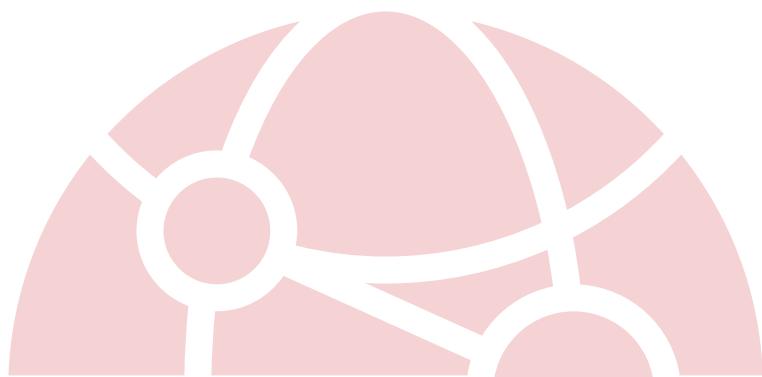
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VI. CLIMATE, CULTURE AND AI FOR AN ENVIRONMENTAL SUSTAINABILITY

As artificial intelligence becomes increasingly embedded in cultural production and climate solutions, a critical question arises: Can AI be part of the solution or is it exacerbating the very environmental crises it claims to solve? This ethical tension, between AI's potential to support sustainability and its mounting ecological costs, frames a pivotal challenge for the coming decade.

As we approach 2030, the convergence of artificial intelligence, cultural expression and environmental sustainability presents both unprecedented opportunities and critical challenges. At a time when the world faces accelerating climate change, biodiversity loss and pollution, urgent systemic change and massive investment in sustainable solutions are imperative (World Economic Forum, 2025).

The environmental cost of digital technologies is significant and rising. The scale is striking: data centres powering AI and digital infrastructure are projected to consume approximately 4% of global electricity by 2026, a figure comparable to the total energy demand of a country such as Japan (IEA, 2025). The training of massive AI models can emit carbon dioxide equivalent to 125 flights between New York and Beijing, while requiring cooling water volumes comparable to those used in the manufacturing of hundreds of electric cars (Scientific American, 2023; MIT News, 2025). Moreover, a single generative AI query may consume five to ten times more energy than a standard web search, raising serious concerns regarding scalability and sustainability.

As a powerful and dynamic general-purpose technology, AI holds unique potential to accelerate the climate transition and drive sustainable growth by scaling innovation. Yet this potential exists within a profound paradox: while AI can be a vital catalyst for climate action and new cultural forms, its own environmental footprint -in soaring energy use, significant water consumption and mounting electronic waste- demands urgent mitigation.

This dilemma is compounded by the *AI Efficiency or Jevons Paradox (Jevons, 1866).* As algorithmic performance improves (e.g., faster processing, lower cost per query), overall demand surges exponentially, potentially offsetting energy savings through increased aggregate consumption.

This section explores this complex interplay between AI, environmental sustainability and cultural production. It asks: Can AI help forge eco-responsible cultural practices? And crucially, can artists and the cultural sector harness AI to powerfully illuminate the need for climate awareness within the technology itself?

The environmental impact of digitalization: Towards eco-responsible practices

Digital technologies, including servers, blockchain, streaming services and gaming, are increasingly contributing to environmental degradation due to their high energy consumption and resource extraction. Among these, data centre operation is one of the fastest-growing industries worldwide. The International Energy Agency (IEA) projected in 2024 that global data centre electricity demand will more than double by 2026, driven largely by AI adoption (IEA, 2024). While current trends are particularly pronounced in the United States, similar patterns are likely to emerge globally, though uncertainties remain due to regional policy and infrastructure disparities.

Data centres, which are essential for storing and processing digital cultural content, are among the world's largest electricity consumers. Video streaming platforms (e.g., Netflix, YouTube) and AI-driven content recommendation systems require energy to function (IEA, 2020). However, the most significant energy demands stem from the training of large language models (LLM) as well as the generation of text, images, audio and video. These processes require vast server farms, many of which are powered by non-renewable sources, leading to substantial carbon emissions (Institute of Energy and the Environment, 2023).

For instance, a study by the Natural Resources Defense Council (NRDC) estimates that data centres in the United States alone could consume up to 140 billion kilowatt-hours of electricity annually by 2025, equivalent to the output of about 30 large coal-fired power plants. According to some projections, the AI industry could contribute to around 2% of global greenhouse gas emissions by 2025, a share comparable to the emissions from the aviation industry. Studies have shown that training large AI models such as GPT-3 can emit over 500 tons of CO, equivalent to the lifetime emissions of 50 average U.S. cars (Columbia Climate School, 2023; ACM, 2023). A 2023 *MIT*

Technology Review Analysis further found that training a single generative AI model consumes 1.2 gigawatt-hours of electricity, equivalent to powering 1,000 households for a full year.

AI systems' escalating energy demands are particularly concerning. According to the Electric Power Research Institute (EPRI) in its 2024 White Paper, generative tools like ChatGPT require approximately ten times more electricity per user prompt than conventional internet searches, rising from 0.3 watt-hours for a typical Google search to 2.9 watt-hours for a generative AI query. The creation of original music, images and videos using AI tools is even more energy intensive. With 5.3 billion global internet users, the widespread adoption of these technologies may lead to a step change in power requirements, with data centres projected to consume 4.6% to 9.1% of U.S. electricity generation annually by 2030.

The environmental footprint of AI also extends beyond energy use to its physical infrastructure. Training and running advanced AI models demand specialized hardware reliant on rare earth metals (such as lithium and cobalt), resources extracted through environmentally damaging and often ethically problematic processes. Moreover, the improper disposal of electronic waste (e-waste) releases hazardous materials like lead and mercury into ecosystems. In addition, the rapid obsolescence of hardware contributes to the accumulation of e-waste. The Global E-waste Monitor 2020 reported 53.6 million metric tons of e-waste in 2019 (equivalent to discarding 4500 Eiffel Towers annually), with recycling stagnating at 17.4%. By 2050, this could exceed 120 million tons (United Nations University, 2020).

This context poses a profound dilemma for the cultural sector. When cultural institutions, artists or cultural professionals adopt AI tools, they indirectly contribute to a cycle where rapid hardware obsolescence generates hazardous e-waste and contributes to a mounting ecological crisis. Thus, a critical

question arises: How can the cultural sector harness AI's creative potential while mitigating its hidden material and environmental costs?

1. LOW-CARBON AI PRACTICES IN CULTURAL PRODUCTION

To mitigate AI's environmental footprint, artists, cultural professionals and cultural institutions are pioneering sustainable approaches that prioritize renewable energy, optimized computation and critical ecological awareness. These practices demonstrate that cultural innovation does not need to come at the expense of environmental responsibility.

Artistic case studies in sustainable AI:
- Renewable Energy Integration (Refik Anadol, 2024). Anadol's Large Nature Model, trained on over 100 million images of coral reefs and ecosystems, explicitly addresses AI's energy demands by partnering with Google and NVIDIA to power computations using 100% renewable energy (NVIDIA, 2024). Anadol's studio also developed tools to monitor energy consumption in real time during AI training, ensuring minimal carbon output. This model, open-sourced for public use, merges scientific data (from Smithsonian; National Geographic) with eco-conscious infrastructure, proving large-scale AI art can thrive without fossil-fuel dependency.
- Resource-Efficient AI Models (Alexandra Daisy Ginsberg: *Machine Auguries*, 2023) Ginsberg's artwork uses generative adversarial networks (GANs) to recreate vanishing birdsong and critically questions AI's environmental cost. She employs compressed datasets and shorter training cycles to reduce energy use, contrasting with commercial AI's resource-heavy norms. Her work highlights a key tension: Can AI memorialize nature without accelerating its destruction? This ethical framework urges artists to reject 'innovation at any cost' and adopt computational restraint as an artistic principle.
- Low-Carbon Materiality (Sophy King & John-Paul Brown: *Guardians of Living Matter,* 2024) In their artwork, King and Brown prioritize low-energy installation methods, combining organic materials with AI-generated narratives about mycorrhizal networks. Their practice avoids energy-intensive displays (e.g.,

blockchain NFTs) in favour of solar-powered projections and recycled electronics, framing sustainability as both theme and methodology. As part of *Lowry's artist cohort* (2024–2026), they advocate for 'carbon budgeting' in digital art production, calculating emissions per artwork to inform design choices.

These pioneering approaches reveal tangible pathways for reducing AI's environmental impact within cultural production. Together, these strategies reframe creativity: not as a race for scale, but as a practice of ecological stewardship.

2. INTERDISCIPLINARY RESEARCH FRAMEWORK FOR CULTURAL SUSTAINABILITY

As discussed, the training and deployment of AI models demand considerable computational power, resulting in high energy consumption, carbon emissions and growing e-waste. Addressing these challenges calls for an interdisciplinary research agenda spanning computer science, art, cultural heritage, policy and environmental science.

A key guiding principle is epistemic justice, "the right of every people to their own knowledge and ways of generating, legitimizing and valuing it" (UNESCO 2023). Grounding AI applications in epistemic justice can support cultural sustainability strategies that respect diverse knowledge systems while addressing ecological constraints.

Key areas of actions include:
- Adopting carbon auditing tools for AI-driven artworks (e.g., Ars Electronica's disclosure protocols);
- Implementing efficiency techniques like model pruning and quantization to reduce energy use by 30-50% without artistic trade-offs; and
- Establishing policy incentives, including grants, certifications and infrastructure support, to promote low-impact AI art.

UNESCO and other organizations have begun catalysing this shift through collaborative initiatives that curate best practices and support artist–institution partnerships focused on computational restraint.

For example, the *Heritage on the Edge* project deploys AI as a culturally anchored conservation

tool at climate-threatened sites. On Rapa Nui, rising seas endanger sacred moai statues; here, energy-efficient edge computing (using 89% less energy than cloud systems) enables local teams to create 3D digital twins while AI predicts erosion hotspots. Critically, Rapa Nui elders guide barrier placements to honour spiritual concepts like *mana* (life force). In Bangladesh, AI trained on 15th-century Persian texts informs salinity-resistant restorations of Bagerhat's mosques. This transcends preservation, it is regenerative co-creation, fusing innovation with living tradition.

UNESCO promotes policies where Local and Indigenous Knowledge Systems (LINKS) retain sovereignty over their data and digital heritage and the application of the principles of free, prior and informed consent, notably in the context of inventorying intangible cultural heritage for its safeguarding. Energy justice principles prioritize solar-powered community servers near heritage sites, avoiding carbon-intensive cloud transfers. As the Rapa Nui team asserts: *"Preservation isn't freezing culture in time, it's empowering its evolution."*

By centring human dignity alongside planetary limits, this approach positions AI as a collaborative partner in Earth's unfolding story rather than a high-tech shortcut. These projects reveal a core truth: sustaining culture in a climate-changed world requires embedding ethical and ecological considerations into AI development itself.

Research must transcend disciplinary silos to pioneer ethically grounded and energy-conscious frameworks. Artistic practice must critically engage with AI as custodians of ecological and cultural integrity. In collaboration, international institutions such as the Green Software Foundation and the Green AI Institute can promote binding commitments towards renewable infrastructure, circular material flows and epistemic justice in AI development.

In this context, sustainable integration of AI into cultural ecosystems demands a fundamental reorientation where technological innovation is inseparable from planetary responsibility. Together, this triad, research rigor, creative vigilance and institutional leadership, forms the bedrock for a future where cultural advancement no longer competes with Earth's resilience but actively sustains it. The path forward is not technical alone, it is a moral recalibration of progress itself (UNESCO, 2021, articles 84, 85 and 86).

B

Artistic creation and sustainability: AI as a tool for environmental awareness

As global environmental crises intensify, the role of art in sustainability discourse becomes vital. AI offers a dual benefit in this context: it can raise environmental awareness through innovative artistic practices and optimize energy management in cultural institutions.

Through strategic deployment of these capabilities, cultural stakeholders can cultivate a more sustainable cultural sector: advancing environmental stewardship, furthering the United Nations' SDGs 2030 and redefining the ontology of digital culture.

1. AI-POWERED ARTISTIC PROJECTS RAISING CLIMATE AWARENESS
AI-driven art projects have the potential to engage audiences in unique and impactful ways, raising awareness about environmental issues such as climate change, deforestation and pollution, by transforming abstract data into emotionally resonant experiences.

A paradigm-shifting example is the Chilean collective *Ecologías Híbridas,* whose interactive installation at the 2023 Venice Architecture Biennale confronted the invisible costs of AI creativity. 'Hybrid Ecologies' transformed generative AI into a site of ecological accountability. Visitors generated images using AI while the installation simultaneously materialized the hidden resource costs: each image generation triggered a proportional release of water (up to 1.5 litres) from ceiling reservoirs into collection basins, directly correlating digital creation with hydrological expenditure (Design Research Society, 2023). This tangible feedback loop exposed the water footprint of computational processes typically obscured by cloud infrastructure, positioning artistic experimentation as a conduit for resource literacy and environmental critique.

Similarly, the *Google Tidal VR* (2024) project immerses users in AI-modelled marine ecosystems, simulating the cascading effects of overfishing and thermal bleaching. Participant surveys reveal a 45% increase in pro-environmental behavioural intent post-exposure (Gómez & al., 2024) and potentially leading to greater public engagement and action.

Beyond speculative futures, AI art also makes ongoing ecological crises viscerally tangible. Other platforms, like *Earthbound* (2024), use GANs to visualize localized climate projections, rendering desertification or flood risks in hyper-personalized street-view simulations. These works exemplify AI's capacity to bridge data and empathy, compelling viewers to confront environmental urgency not as distant statistics, but as embodied realities.

At the same time, there is a need for research on how AI can facilitate sustainable practices in artistic creation itself. This includes exploring eco-friendly materials for art production and developing AI tools that help artists assess and reduce the environmental impact of their work.

2. OPTIMIZING ENERGY MANAGEMENT IN CULTURAL INSTITUTIONS

Cultural institutions, such as theatres, museums, galleries and libraries, have historically been energy-intensive due to lighting, heating and cooling requirements. Today, AI can play a crucial role in optimizing energy management within these institutions, reducing their environmental footprint while maintaining optimal conditions for their operation (ICOM France, 2025).

The emergence of 'Smart Museums' exemplifies how AI can analyse real-time energy usage patterns and adjust parameters to reduce unnecessary consumption. Beyond daily operations, AI also enhances the sustainability of events by leveraging historical data to forecast energy demand, thereby optimizing system performance while ensuring a high-quality visitor experience. The Smithsonian Institution's 2025 *Green Museums Initiative* reports that AI-powered Building Management Systems (BMS) can reduce energy consumption by 18-32% without compromising collection integrity.

Other notable examples of AI integration in cultural institutions include:
- Musée d'Orsay, Paris: Implementation of a Convolutional Neural Network (CNN) to modulate heating, ventilation and air conditioning (HVAC) systems based on visitor density reduced annual energy use by 25%, saving €320,000 in operational costs (Dupont & al., 2024).
- National Museum of Modern and Contemporary Art, Seoul: A reinforcement learning model optimized humidity control for Joseon-era paper artworks, decreasing energy demand by 30% while maintaining 0.5°C stability (Park & Lee, 2023).
- Sydney Opera House: Integration of AI with renewable microgrids increased onsite solar utilization by 40%, achieving ISO 50001 energy management certification in 2024 (ClimateWorks Australia, 2024).
- The European *Union's Digital Green Deal* (2023) mandates that publicly funded cultural institutions adopt ISO/IEC 30134-2 standards for AI energy efficiency by 2030. Non-compliant entities face reduced subsidies, incentivizing sector-wide adoption of low-carbon algorithms (European Commission, 2023).
- ICOM France has recently launched the AI & Museums Global Survey, which seeks to collect insights on current uses, challenges and expectations on AI in museums, highlighting the growing relevance of AI in the sector.

C

Conclusions

As we navigate the complexities of the digital age, the intersection of culture and climate presents both challenges and opportunities. The environmental impact of digitalization, while significant, can be mitigated through the adoption of low-carbon technologies and sustainable practices. Meanwhile, AI emerges as a powerful tool not only for optimizing energy management in cultural institutions but also for raising awareness about environmental issues through innovative artistic projects.

AI's integration into the cultural sector embodies technology's defining paradox: it amplifies both planetary degradation and resilience. While the environmental toll of computation, its voracious energy appetite and mounting e-waste, threatens ecological stability, this crisis is not inevitable. Countermeasures are emerging through deliberate stewardship and three interlinked strategies are key to this transformation:

1. **Algorithmic frugality:** adopting sparse neural networks and quantum-inspired architectures to slash computational demands) reduces resource burdens;
2. **Epistemic justice:** centring Indigenous and Global South perspectives realigns innovation with biocultural wisdom;
3. **Symbiotic governance** (scaling initiatives like 'African Parks', Germany's 'Breeze Technologies' and Indian's & Ethiopian's 'Digital Green') bridges ethical imperatives with industry capacity.

Together, these pathways present AI as a tool whose ecological impact depends on how we address the Efficiency Paradox. Algorithmic frugality and epistemic justice must work in tandem: sparse neural networks reduce per-unit energy, while Indigenous stewardship principles constrain extractive scale. Symbiotic governance succeeds only if it prioritizes absolute emissions caps over efficiency gains, ensuring cultural innovation aligns with Earth's finite boundaries. Thus, the paradox becomes a compass: true progress measures not computational speed, but ecological integrity sustained.

AI is also increasingly used to monitor, model and preserve cultural heritage sites affected by environmental degradation, from rising sea levels to desertification, from context of crisis to heritage resilience (see Section 7). It is important to acknowledge that digital twins, predictive simulations and AI-powered risk mapping form a crucial part of eco-responsible innovation within the cultural sector.

By leveraging AI to enhance sustainability in digital cultural content and artistic creation, we can foster a more environmentally conscious cultural sector. This sector can, in turn, inspire broader societal changes that align with the vision of sustainable development by 2030. For example, a 'Green AI Culture Fund' could be established supporting cultural projects adhering to ISO lifecycle assessments.

Future scholarship must interrogate AI's role in cultural homogenization versus its potential to amplify polyphonic climate narratives. As the Anthropocene epoch demands radical interdisciplinary collaboration, the fusion of computer science, environmental humanities, artistic practice and international institutions' commitment, offers a scaffold for reimagining culture as both a mirror and motor of sustainability.

Yet beyond knowledge creation and discrete initiatives, strong cross-sectorial and enforceable public policies are necessary. Climate-related cultural policies must be embedded in comprehensive AI frameworks and regulations, imposed on all AI actors, including mandatory energy consumption reporting, environmental impact assessments, carbon footprint disclosure, measures to incentivize sustainable AI development, among others. Urgent systemic actions are required for an effective and ethical handling of AI's environmental impact in the cultural sector and beyond.

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VII. ENDANGERED HERITAGE AND AI: TOOLS FOR SAFEGUARDING AND RESILIENCE

Digital Heritage: AI for the Protection and Conservation of Cultural Heritage

As introduced in Section V, AI-driven modelling and simulation tools are playing an increasingly important role in the protection of heritage sites exposed to diverse risks. These technologies support informed conservation and protection strategies and also contribute to sustainable tourism, digital storytelling and climate adaptation planning.

The integration of AI technologies is set to play a central role in the preservation of endangered cultural heritage. This applies across these interrelated domains:

- **Tangible Cultural Heritage:** This refers to physical objects and structures of historical, artistic or cultural significance. Examples include monuments, paintings, archaeological sites, manuscripts, sculptures, architectural artifacts and underwater heritage.
- **Intangible Cultural Heritage:** Defined by the 2003 UNESCO Convention, this includes practices, expressions, knowledge and skills as well as the instruments, objects and spaces associated with them, that communities recognize as part of their cultural identity. Intangible heritage encompasses oral traditions, languages, traditional craftmanship, performing arts, rituals, festive events and more. (UNESCO 2003). It is particularly vulnerable to erosion, especially among marginalized or rapidly modernizing communities.

Digitization, conservation and protection processes are increasingly supported by AI-driven methods, providing precise, efficient and scalable solutions for safeguarding cultural heritage. With growing threats to heritage, including environmental degradation and the climate crisis, conflict and political instability and rapid or illicit trafficking, AI technologies offer a powerful opportunity to monitor, protect and restore heritage assets for future generations.

Beyond protection and conservation, AI also facilitates the adaptive reuse of heritage by enabling virtual access, immersive interpretation and sustainable tourism. These applications help minimize physical impact on fragile sites while expanding global access and public engagement. Moreover, AI tools are becoming increasingly aligned with global policy frameworks, such as UNESCO's digital transformation agenda (UNESCO, 2023) and Sustainable Development Goal (SDG) 11.4, which calls for strengthened efforts to protect and safeguard the world's cultural and natural heritage.

1. RESTORATION AND DIGITAL RECONSTRUCTION: REVIVING CULTURAL OBJECTS WITH AI

AI has also emerged as a valuable tool in cultural restoration, supporting efforts to revive and reconstruct damaged or incomplete works of art and heritage. From

restoring faded pigments to speculatively reconstructing missing or sections, AI is increasingly assisting conservators in highly detailed preservation tasks. A notable case is the digital reconstruction of the Colosseum in Rome, where AI algorithms have been used to visualize the monument's original form by virtually filling in eroded and damaged areas (Ibrahim, 2024). This innovative work demonstrates how AI-driven techniques can enhance our understanding and appreciation of historic monuments. Yet it also brings ethical considerations to the forefront, particularly the tension between authentic restoration and speculative interpretation. How far should technology go in reimagining the past?

A notable EU-funded initiative, the PERCEIVE project, brought together twelve major European museums to explore AI's potential in restoring iconic artworks (Amant, 2024; PERCEIVE, 2023). One highlight was the enhancement of Edvard Munch's iconic 'The Scream', where machine learning tools were used to digitally revive faded colours and re-establish visual coherence. These AI-powered processed offered new ways of preserving artworks while maintaining their cultural and aesthetic value.

AI's capabilities also extend to reconstructing lost artworks. For example, three paintings by Gustav Klimt, destroyed during World War II, were digitally revived using AI models trained on Klimt's existing works (McGreevy 2021). Researchers leveraged sophisticated algorithms trained on Klimt's oeuvre to meticulously restore the original colours and compositions, thereby reanimating historical masterpieces long believed irretrievably lost.

B

Combating Illicit Trafficking of Cultural Property

The illegal trafficking of cultural artifacts remains a serious global threat, undermining cultural identities and collective memory. AI technologies are proving to be powerful tools in the fight against this form of cultural loss, significantly improving detection, prevention and recovery efforts. This approach aligns with the G7 Naples Declaration of the Ministers of Culture (2024), which encourages "the development of and use of advanced AI-powered investigative tools to analyse the art market and to monitor and inspect the illegal trade of cultural property" (G7 Italia, 2024). Pioneering examples include the AI-powered Stolen Works of Art Detection System (SWOADS) developed by the Italian Carabinieri Command for the Protection of Cultural Heritage (Council of Europe, 2024). INTERPOL's ID-Art mobile application, which uses machine vision technology to identify stolen cultural objects in real time (INTERPOL, n.d.). Users can scan artifacts and compare them against a global database of over 52,000 stolen items reported by 134 countries (ibid.).

This AI-powered tool substantially strengthens international capacity to combat the trafficking of cultural property, enabling faster identification and recovery of stolen items.

AI also plays a growing role in monitoring looting and illicit excavation. For example, satellite imagery analysis powered by machine learning allows authorities to detect suspicious activities at archaeological sites. Platforms like HeritageWatch.AI exemplify how machine learning can automatically identify patterns indicative of illicit activities, facilitating rapid response and proactive protection of vulnerable heritage sites globally (Jebb, 2025). Through predictive analytics, these AI solutions empower authorities and heritage conservation bodies to act swiftly and more effectively. Yet measures should be taken to avoid AI biases and risks in identifying artifacts, such as false positives/negatives and cultural misclassification.

These advancements are reinforced by international coordination frameworks involving UNESCO, the World Customs Organization (WCO) and INTERPOL, which support harmonized regulations, cross-border collaboration and capacity-building initiatives. The UNESCO virtual museum of stolen cultural objects, led jointly with INTERPOL and to be launched at MONDIACULT 2025 illustrates this kind of partnership. Looking ahead, the development of a shared global AI-powered database of looted and trafficked cultural property could significantly enhance the traceability and recovery of artifacts. Such a system would facilitate real-time data exchange, support provenance research and promote collective accountability in safeguarding cultural heritage.

1. BLOCKCHAIN AND CULTURAL AUTHENTICITY: COMPLEMENTARY ROLES OF AI
While artificial intelligence strengthens detection and analysis, blockchain technology complements these efforts by ensuring the authenticity, traceability and legal provenance of cultural artifacts. Blockchain's direct dependency on AI is nascent, yet it holds enormous potential in creating transparent, immutable records of artifact provenance, thereby combating forgery and unauthorized replication — challenges intensified by the proliferation of AI-generated forgeries.

Initiatives like the Art & Antiquities Blockchain Consortium (AABC) (Whitaker et al., 2020) and various UNESCO-backed blockchain projects illustrate the technology's utility in maintaining provenance transparency and traceability (Liu et al., 2025). By securely documenting the ownership history and authenticity of artifacts, blockchain can effectively counteract threats posed by counterfeit and illicitly trafficked cultural items.

The interoperability between AI and blockchain lies in their complementary strengths: AI can analyse vast datasets to detect anomalies or predict risks, while blockchain ensures that the resulting insights, records or classifications are transparent, tamper-proof and auditable (Bhumichai et al., 2024). For example, AI-driven image analysis might identify subtle forgeries and blockchain can record that forensic evaluation as part of an artifact's immutable digital history. Together, these technologies support more resilient, verifiable systems for the protection and authentication of cultural heritage.

C

Digitization and Safeguarding: Protecting Cultural Heritage at Risk

1. INTERNATIONAL PROTOCOLS FOR DIGITIZATION IN CRISIS SITUATIONS
Artificial Intelligence is emerging as a vital tool with the potential to transform emergency strategies for safeguarding cultural heritage. AI significantly enhances digitization initiatives, particularly during crises or armed conflicts, where rapid documentation and preservation of cultural heritage materials are essential. International protocols for emergency digitization now integrate AI technologies, such as Optical Character Recognition (OCR), to swiftly convert physical documentation into searchable digital archives. An example is Saving Ukrainian Cultural Heritage Online (SUCHO) (SUCHO, 2022), which used AI-enhanced OCR in conjunction with the Internet Archive to digitize and preserve cultural materials at risk of loss. This approach not only preserved critical documentation but also improved its accessibility and searchability, ensuring that scholars, heritage professionals and the public can continue to engage with these resources in the future.

In addition to document-based archives, AI-assisted workflows have also supported the digitization of built heritage, employing tools such as drone imagery and 3D modelling to

capture detailed records of damaged historic buildings and urban centres. These methods have been deployed in post-crisis contexts, including Beirut (Kallas and Napolitano, 2023a) and Ukraine (Wilson, 2025), enabling faster condition assessments and supporting informed, targeted interventions.

For such protocols to be operational and impactful, capacity-building is critical. Training local professionals to apply these tools and technologies in real-time ensures that digitization strategies can be effectively deployed during emergencies. Moreover, it strengthens long-term resilience by empowering local actors to sustain, expand and adapt preservation efforts well beyond the immediate crisis, safeguarding both the heritage itself and the knowledge required to protect it.

2. 3D DOCUMENTATION AND DAMAGE ASSESSMENT: AI FOR EMERGENCY CONSERVATION PLANNING

AI-assisted 3D reconstruction technologies have made remarkable strides in cultural heritage preservation. These advancements include AI-driven techniques to create precise and detailed digital replicas or 'digital twins' of cultural heritage sites and artifacts. In November 2024, the unveiling of an unprecedented 3D replica of St. Peter's Basilica, developed through the integration of AI and over 400,000 images using image-based modelling, marked a significant milestone in heritage digitization (Marshall, 2024). This digital twin not only serves as a virtual access point but also significantly contributes to conservation efforts by identifying structural vulnerabilities and assisting in restoration planning.

New developments in AI-driven imaging allow experts to generate highly detailed 3D models from ordinary photographs, even in difficult or inaccessible environments. By eliminating the need for specialized scanning equipment or on-site access, these methods bring new levels or accessibility and scalability to heritage preservation. They also enhance reconstruction precision, offering richer spatial accuracy and visual detail for both immersive public engagement and conservation planning. AI-enhanced workflows now extend beyond visualization to incorporate automated damage detection and classification. By analysing thousands of images and integrating the results into annotated 3D environments, these systems can identify issues such as cracks, façade displacement or roof collapse in near real time. This enables faster, evidence-based decision-making during emergencies and helps prioritize interventions more effectively. This approach was first demonstrated through post-disaster research following the 2020 Beirut explosion (Kallas and Napolitano, 2025) and similar methodologies are now being adapted to assist cultural damage assessments in Ukraine.

These tools are increasingly relied upon in conflict zones and disaster-affected areas, where access to sites may be limited. AI-supported analysis can identify structural defects and other major vulnerabilities remotely, significantly reducing the time required for on-site assessments. By accelerating damage inspection and enhancing precision, these methods strengthen both emergency response and long-term restoration planning. and risk mitigation.

To ensure these technologies are deployed ethically and inclusively, there is an urgent need for shared international standards governing AI-driven 3D modelling of cultural heritage. These should address issues such as data ownership, informed consent, cultural sensitivity and equitable access. Such guidelines must be developed collaboratively with local community, heritage institutions and international bodies including UNESCO and ICOMOS. In parallel, the development of AI-enhanced emergency response toolkits, specifically designed for use by Ministries of Culture, could enhance rapid assessment and stabilization efforts following disasters or conflict.

3. POSSIBLE RISKS OF AI MISUSE IN CULTURAL HERITAGE CONTEXTS

While AI offers powerful tools for preservation and restoration, it also introduces new and complex risks. Generative AI can be used to create deepfakes and manipulated reconstructions, fabricating artifacts, cultural misrepresentation, altering historical events or producing architectural simulations that advance specific ideological agendas. In politically sensitive or contested regions, such fabrications could be weaponized to legitimize territorial claims, erase minority histories or promote exclusionary nationalism.

Unlike traditional forgeries, AI-generated outputs can be produced rapidly and disseminated widely, making them harder to detect and more impactful in shaping public perception. Additionally, generative models trained on biased or incomplete data may unintentionally reinforce dominant historical narratives while sidelining alternative or marginalized voices. The risks extend to academic and institutional settings, where AI-generated reconstructions might be accepted as authentic without adequate verification.

The need for critical oversight in how AI tools is applied to cultural data is more urgent than ever. Transparent methodologies, traceable provenance for digital assets and interdisciplinary review mechanisms are essential to ensure that digital heritage outputs are not used to distort or manipulate historical understanding. Addressing these risks requires not just technical safeguards, but also ethical guidelines that recognize the socio-political contexts in which heritage is produced, interpreted and contested.

4. AI FOR A FASTER POST-DISASTER RESPONSE: PRIORITIZING, ACTING, PLANNING

AI technologies are transforming not only how damage to cultural heritage is documented, but also how it is understood and addressed. By analysing patterns across large datasets, AI can help identify which buildings or heritage sites are more vulnerable to specific types of damage, even before a disaster occurs. This allows experts to prioritize interventions more strategically, allocate resources more effectively, inform restoration planning with deeper insight into long-term risks and support the development of risk preparedness strategies.

In recent post-crisis contexts, predictive modelling has begun to support efforts to understand how different types of historic structures respond to disasters (Kallas and Napolitano, 2023b). These tools are now helping to inform not just immediate recovery, but also long-term retrofitting strategies and resilience planning. While much of this work has focused on historic buildings, similar approaches could be extended to other forms of cultural heritage, including archives, collections and even intangible heritage practices that may be affected by environmental or conflict-related risks.

As AI models continue to evolve, their potential to guide smarter, faster and more sustainable heritage response grows. Integrating predictive insights into emergency protocols can support more informed planning and contribute to building back better in ways that protect tangible and intangible culture and their underlying meaning.

D

Preserving Languages and Ancestral Knowledge: AI and Oral Traditions

1. AI LINGUISTIC MODELS FOR ENDANGERED LANGUAGES

AI plays a crucial role in preserving endangered languages and ancestral knowledge, utilizing sophisticated linguistic modelling and archival techniques to expand metadata and extract deeper meaning. Projects such as IBM's linguistic models for endangered Indigenous languages (Tanner and Kerry, 2025; Martineau, 2021) and Google's Woolaroo illustrate how AI-driven platforms can help communities document, archive and actively revitalize linguistic heritage (Pattison, 2021; Viannis 2024). By offering intuitive and accessible interfaces, these initiatives contribute to linguistic resilience and cultural continuity.

However, the promise of these tools and initiatives must be weighed against the realities of centralized ownership and data governance (Tu, 2025). Many of the most visible initiatives are developed and controlled by large technology companies, raising concerns around data sovereignty, long-term access and community control. Relying exclusively on corporate platforms for cultural preservation may inadvertently reinforce extractive data practices and limit the agency of the very communities these tools aim to serve.

In response, there is a growing movement towards community-owned, open-source or locally governed AI models, particularly in the Global South, where many endangered languages are spoken. These decentralized approaches prioritize self-determination, equitable participation and cultural alignment. For example, Lelapa AI and Masakhane are building small language models tailored to African languages, offering an alternative model that puts linguistic stewardship back in the hands of the communities themselves (Tsanni, 2023).

Such tools not only preserve linguistic heritage but also help reinvigorate cultural identities, connecting younger generations with ancestral traditions. By embracing these more inclusive and community-centred models the field of

AI-driven linguistic preservation can better support cultural continuity while addressing system imbalances in data ownership and access.

Ultimately, whether driven by grassroots communities or major tech companies, AI-enabled language preservation offers significant socio-cultural benefits, fostering intercultural understanding and contributing to the world's linguistic and cultural diversity.

2. SUPPORTING LOCAL COMMUNITIES WITH AI

Local communities remain central to successful heritage preservation and AI can amplify their role. Accessible AI tools, combined with community-based training programmes, allow local stakeholders to actively participate in cultural heritage projects, from data creation and digitization to monitoring and conservation.

Crowd-sourcing initiatives empowered by AI facilitate broad-based community involvement, enabling culturally relevant data collection and fostering sustainable, community-driven preservation. UNESCO has supported projects and grassroots cultural organizations that leverage AI to build local capacities, ensuring preservation initiatives are effective, inclusive and respectful of community autonomy and heritage (UNESCO, 2025a; UNESCO, 2025b).

To expand these efforts, dedicated funding models such as microgrants, public-private partnerships and heritage innovation funds should be developed to support community-led AI initiatives. These models would ensure equitable access to resources, infrastructure and training, particularly in underserved regions. A global 'AI for Communities' capacity-building programme could further empower local actors. Such a programme would promote AI literacy, offer open-source tools and provide technical mentorship, aligning with UNESCO's broader goals for inclusive digital transformation and sustainable cultural development.

3. IMMERSIVE STORYTELLING AND COMMUNITY NARRATIVES

AI is also transforming how cultural stories are told and shared, enabling immersive, community-driven experiences that preserve multiple perspectives and cultural memories. While many current platforms rely on human-curated content, AI tools are playing a growing role in enabling the infrastructure behind these experiences, such as 3D modelling, natural language processing and metadata organization.

For example, CyArk's Tapestry platform (CyArk, 2021) allows high-resolution 3D models of heritage sites to serve as canvases for layered storytelling, where communities can contribute oral histories, ambient audio and archival imagery. While the narratives are curated by people, AI-powered tools are often used in the digitization process and in managing large volumes of multimedia data. These projects lay the groundwork for future AI-enhanced storytelling systems, where virtual tours could be dynamically adapted, translated or personalized based on users' cultural or linguistic backgrounds.

Looking forward, the convergence of AI and immersive heritage technologies has strong potential to reshape how cultural memory is experienced and shared. When grounded in ethical co-creation with communities, these tools can support cultural continuity, broaden access and challenge dominant narratives by amplifying diverse voices and lived experiences.

E

Conclusions

AI offers transformative opportunities for safeguarding endangered cultural heritage, by enabling faster, more precise and more inclusive approaches to preservation. Across this chapter we have seen its transformative potential in five key domains:

- **Restoration and reconstruction:** AI-driven modelling can revive lost artworks and monuments
- **Combating Illicit trafficking**: Machine vision and predictive analytics enhance artifact tracking and recovery, with blockchain technologies reinforcing provenance verification
- **Digitization and emergency safeguarding:** AI-assisted imaging, 3D modelling and automated damage detection accelerate crisis response while improving long-term documentation standards
- **Post-disaster and risk preparedness**: Predictive modelling and vulnerability assessments support smarter resilience planning
- **Preserving languages and oral traditions:** Linguistic AI tools, especially when community-governed, are revitalizing endangered languages and amplifying diverse cultural narratives through immersive, participatory storytelling

Yet these opportunities must be pursued with equal attention to risks. Generative AI can fabricate false histories; biased datasets may marginalize vulnerable voices; and unequal access to technology can deepen cultural imbalances. Mitigating these risks requires transparent methodologies, ethical safeguards, community participation and alignment with global policy frameworks. Integrating advanced tools with traditional preservation methods and embedding them within culturally sensitive approaches, will significantly enhance global capacity to protect and celebrate humanity's shared heritage.

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VIII. AI, FREEDOM AND CULTURAL SOVEREIGNTY

Over the past decade, artificial intelligence (AI) has progressively expanded its influence across culture and the arts reshaping how cultural narratives are created, curated and experienced. By determining which perspectives gain visibility and legitimacy, AI not only affects processes of cultural valuation but also acquires a normative role in defining what is considered significant. At the same time, because the design and control of AI systems are concentrated within a few global technology corporations, pressing concerns arise regarding fairness, openness and communities' ability to preserve cultural autonomy.

This section explores the cultural and political dimensions of AI, focusing on its role as a tool rather than a substitute for culture and creativity. It examines AI's dual potential: on the one hand, as a means of supporting creative expression and safeguarding human authorship; on the other, as a mechanism that risks consolidating control and reshaping cultural production in ways that marginalize less dominant voices. Attention is given to the harms of algorithmic bias, which can systematically disadvantage certain communities, as well as to the broader systemic risks posed by centralized digital control. Building on recent international initiatives, the section then puts forward actionable policy recommendations aimed at making AI systems transparent, inclusive and grounded in human rights.

Ultimately, this section underscores the importance of ensuring that AI does not unilaterally determine the cultural future, but that communities are empowered to shape it in ways that safeguard and promote cultural diversity.

Empowerment vs Control

AI carries a dual potential: it can empower individuals and communities, but it can also weaken them through mechanisms of surveillance, dependency and the concentration of power (Council of Europe, 2024). The extent to which AI fosters emancipation or control ultimately depends on the frameworks governing its design and deployment. Central to this dynamic is the question of responsibility, particularly the responsibility of decision-makers to ensure that individuals and communities retain their capacity for agency and self-determination.

Practical experiences have demonstrated that AI, if thoughtfully implemented, often augments rather than supplants human creativity.

An early example is the collaboration between the artist Roman Lipski and scientists in developing an AI-based system. In 2016, he introduced the so-called *AI Muse*, which enabled artistic creation through processes of communication and exchange. Rather than overriding the artist's instincts, the system functioned as a generative partner. This case illustrates how AI, when framed as a co-creative tool, can expand aesthetic possibilities without diminishing human authorship.

Nevertheless, caution is necessary when considering broader applications of AI. In domains where AI is deployed primarily for automation, efficiency, or the execution of routine tasks, risks of over-dependence and de-skilling are significant (See section V). As in past technological revolutions, certain human capacities may erode as others emerge,

potentially undermining critical reflection and user confidence in personal judgment (Montreal AI Ethics Institute, 2024; UNESCO, 2020). Preserving cultural and intellectual freedom thus requires systematic ethical scrutiny of AI's integration into work processes, with a particular emphasis on keeping human discernment at the centre of decision-making (Council of Europe, 2024).

Encouragingly, there are community-led initiatives that demonstrate how AI can strengthen cultural sovereignty. In Aotearoa New Zealand, *Te Hiku Media* has pioneered Maori language AI technologies that not only revitalize Indigenous knowledge but also ensure local control of digital infrastructure, supported through significant public and philanthropic investment (Lee, 2024). In India, the *Bhashini* initiative (Bhashini, n.d.), developed by the Ministry of Electronics and Information Technology (MeitY) as part of the National Language Translation Mission, offers real-time translation across 22 official languages. By promoting linguistic equity and reinforcing cultural identity in digital spaces, it provides a model of how AI can enhance inclusivity at scale.

Together, these cases underscore a critical insight: equitable access, local agency and meaningful representation are essential principles to prevent AI from undermining cultural sovereignty and to contribute to a more just and inclusive digital future.

B

Algorithmic Power and Sovereignty

Algorithmic power and sovereignty have become central determinants of cultural and artistic freedom. The way algorithms are designed, deployed and regulated directly conditions the foundations of creative expression. When algorithms censor content, impose aesthetic uniformity or amplify misinformation, they undermine cultural diversity and weaken democratic participation.

A distinctive pattern emerges in contemporary digital infrastructures: recommendation and ranking systems disproportionately privilege commercially viable content, while innovative, experimental or culturally specific voices remain marginalized. This imbalance reflects the concentration of power in a small number of global technology corporations that control algorithmic logics, training data and distribution platforms (OECD, 2021). Such asymmetries not only shape cultural visibility but also affect how communities, values and identities are represented and transformed.

Safeguarding freedom of expression, therefore, requires more than legal guarantees. It depends on the design principles of digital infrastructures, including the openness of platforms, interoperability across systems and the transparency and accessibility of algorithms and training data. These factors collectively constitute the foundations of infrastructural justice.

A first step toward ensuring such justice is to integrate transparency, participation and inclusivity into the full lifecycle of AI—from design and training to deployment. Public institutions should promote context-sensitive, freely accessible AI systems that remain under community control. A noteworthy example is *Tirtha*, an Indian platform that uses AI-supported photogrammetry and community-sourced images to generate 3D models of endangered cultural sites (Shivottam and Mishra, 2023). Crucially, both data and infrastructure are managed locally, ensuring that heritage preservation efforts are aligned with cultural sovereignty. This illustrates how community-driven data pools can help safeguard languages, traditions and knowledge systems.

To maximize long-term benefits while minimizing risks, regulatory frameworks should require AI systems to disclose filtering, ranking and suppression mechanisms, along with transparent documentation of training data. Such measures rely heavily on political commitment and sustainable funding streams that enable artists, technologists and researchers to co-develop inclusive AI tools.

To achieve lasting impact, these initiatives must also be situated within a broader international framework. Only through sustained global exchange and solidarity can culturally inclusive AI standards be articulated and implemented. Prominent examples include the participatory governance models developed by the Montreal AI Ethics Institute (2024), the Latin American Observatory for AI (n.d.) and Society's work on epistemic justice and the transparency requirements embedded in the EU AI Act (2024).

All in all, community-oriented approaches, such as the co-creation of algorithms that embed indigenous knowledge, the maintenance of multilingual datasets and the promotion of open education, hold the potential to transform algorithms from tools of control into instruments of cultural self-determination.

C

AI Monopolies and the Crisis of Cultural Infrastructure

The concepts of *techno-feudalism* and vectorialism provide useful frameworks for understanding the increasing concentration of cultural and informational infrastructures. Techno-feudalism describes the quasi-feudal power of a small number of technology companies that dominate digital infrastructures, platforms and data ecosystems. *Vectorialism,* as articulated by Wark (2004), identifies a form of class power in which control rests with those who command the "vectors" of information, i.e. networks, communication flows and intellectual property regimes. Together, these concepts highlight a dual crisis: democratic control mechanisms are steadily weakened, while the diversity and resilience of cultural ecosystems are undermined.

This concentration of power has severe implications for the cultural and creative sectors. According to the OECD (2021), 99% of businesses in these fields are small and medium-sized enterprises (SMEs), many of which lack the resources to compete with dominant global platforms. Limited or restricted access to user data exacerbates these disparities, intensifying the competitive advantages of large corporations and further entrenching their infrastructural dominance. As a result, creators, particularly in music, film and media arts, become increasingly dependent on a handful of distribution channels that exert disproportionate influence over visibility, remuneration and artistic freedom (UNESCO, 2023).

UNESCO's guide *Culture in Crisis: Policy Guide for a Resilient Creative Sector* (2020) underscores the urgency of addressing this imbalance. A central recommendation is the expansion of public digital infrastructures, which would reduce structural dependence on commercial platforms and allow cultural producers to sustain diverse, independent and locally anchored practices. Without such measures, large-scale AI systems risk privileging dominant languages, formats and narratives, thereby narrowing the scope of cultural expression and representation.

Emerging initiatives illustrate more participatory pathways. *The Digital Creativity Lab* (UNESCO, n.d.), launched in 2022 and now in its second phase (2025–2026), supports young cultural entrepreneurs and professionals in countries such as Thailand, Indonesia and Moldova. These type of initiatives promote digital literacy, sustainable design and community capacity-building as structural responses to concentrated technological power.

Beyond the cultural sector, structural solutions must also address macroeconomic dependencies. Policy instruments such as progressive taxation of large AI systems could help redistribute resources and make the digital economy more equitable. Complementary approaches include promoting decentralized and task-specific AI architectures. Such models are typically more energy-efficient, locally adaptable and easier to govern, while also expanding creative freedom rather than seeking to replace it. They allow communities to shape AI systems according to local cultural priorities, thereby counteracting homogenizing market pressures.

D

Conclusions

Artificial intelligence is becoming a decisive force in shaping cultural visibility, public discourse and the diversity of voices in the digital sphere. Its growing power can either strengthen creative ecosystems and cultural participation or, conversely, silence alternative narratives and reinforce structural asymmetries. The protection of cultural sovereignty, therefore, cannot rely solely on legal measures; it must also be embedded within the architecture and governance of digital infrastructures themselves.

Centralized AI architectures risk consolidating control, narrowing the range of cultural expression and marginalizing less dominant knowledge systems. To counter these risks, the development of transparent, inclusive and democratically accountable AI systems is essential. This requires urgent and coordinated international action to ensure cultural sustainability in the digital age through five key priorities:
- Fostering open and decentralized AI models
- Building national and regional data commons

- Mandating algorithmic transparency and disclosure of training data
- Investing in capacity building and local innovation
- Strengthening international collaboration on cultural AI standards

At the same time, it is essential to acknowledge the challenge of balancing openness and commons-based approaches with the legitimate protection of intellectual property rights. The development of advanced algorithms, large-scale infrastructure and foundational models often requires substantial investment by private actors, whose contributions must be safeguarded in order to sustain incentives for continued innovation.

Ultimately, the task ahead is to design and govern AI systems in ways that safeguard cultural sovereignty, empower communities and promote diversity, ensuring that digital technologies function not as instruments of control, but as infrastructures of cultural self-determination.

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CONCLUSIONS

The rapid integration of artificial intelligence into cultural ecosystems presents humanity with a defining paradox: unprecedented potential for enhancing creativity and protecting heritage, alongside grave risks of cultural homogenization, dispossession and inequity. As this document underscores, generative AI transcends mere replication; it actively reinterprets and recomposes cultural expressions, demanding urgent, coordinated global and local actions to ensure it enriches rather than erodes human diversity.

The converging crises of technological acceleration, digital divides and ethical vulnerabilities necessitate a paradigm shift in cultural governance, centred on three imperatives:

1. Governance anchored in rights & integrity: AI must serve cultural sovereignty, not undermine it. Defend creators' rights against systemic AI infringement through legal innovation and technical guardrails. This requires:

- **Radical transparency:** Mandating disclosure of training data sources and algorithmic processes (as proposed by UNESCO's Recommendations and the EU AI Act);
- **Robust protections:** Closing and updating legal loopholes enabling cultural extraction, ensuring fair compensation for creators via enforceable licensing frameworks and safeguarding against algorithmic bias; and
- **Cultural commons stewardship:** Developing ethical governance for *implicit* cultural data (e.g., social patterns, linguistic heritage) through inclusive benefit-sharing models, such as targeted AI levies.

2. Equitable creative economies & pluralistic ecosystems: Counter algorithmic homogenization and platform dominance to preserve cultural pluralism and sovereignty. Resist platform monopolies and creative monocultures by:

- **Promoting algorithmic pluralism and discoverability of local content:** Enforcing diversity in AI systems to counter homogenization and amplify marginalized voices;
- **Building sovereign infrastructure:** Supporting public computational resources, open-source alternatives and South-South partnerships to reduce dependency; and
- **Centring human agency:** Ensuring AI augments -not replaces- creative labour through reskilling initiatives and ethical IP frameworks.

3. Sustainable & resilient cultural futures: Re-balance the AI-driven creative economy to prevent extraction and prioritize human creative agency. Confront AI's environmental toll and harness its power for resilience:

- **Ecological stewardship:** Prioritizing 'algorithmic frugality,' low-carbon technologies and ISO- certified sustainability in cultural AI projects;

- **Heritage safeguarding:** Scaling AI-powered digitization, predictive conservation and anti-trafficking tools, especially for climate-threatened heritage via global 'heritage cloud labs'; and
- **Epistemic justice:** Integrating Indigenous and local knowledge into AI design to align innovation with biocultural wisdom.

This Report aspires to catalyse policy dialogue on digital cultural policies, grounded in the principle that technology must serve humanity by placing cultural diversity, equity and sustainability at the core of AI governance. UNESCO Member States must act decisively:

- Integrate culture into national AI strategies, prioritizing risk assessment, contemporary creation and heritage resilience;
- Foster transnational collaboration to bridge digital divides, uphold linguistic diversity and protect vulnerable communities; and
- Invest in cultural-AI literacy through education partnerships that balance technical skills with critical creativity.

Without thoughtful and collective governance, AI could narrow the diversity of human culture by reinforcing uniform patterns and outputs and deepening inequities nationally and internationally. Systemic policy choices therefore play a critical role in ensuring that AI supports cultural pluralism and ignites renewed opportunities for global expression. At MONDIACULT 2025, let us commit to governance that places *human dignity, equity and planetary boundaries* at the core of technological progress.

THE TIME FOR ACTION IS NOW!

BIOS OF EXPERT GROUP MEMBERS

SALIM DADA (CHAIR)

Salim is a musician, composer, conductor and cultural policy expert. He has extensive experience in monitoring policies relating to cultural and creative industries. Since 2018, he has been heavily involved in this field, particularly through his role as Chairman of the National Council for Arts and Literature in Algeria. In this position, he monitored the situation of artists, the creation of the Nomenclature of artistic and literary professions and contributed to the development of associations promoting cultural life. In 2020, Salim held the position of Secretary of State for Cultural Production, working on the drafting of the first bill to protect the socio-professional situation of artists in Algeria, as well as on the project for the country's first arts high school. As a specialist in the 2005 Convention, Salim has worked alongside UNESCO on several projects as a focal point, national expert and drafter of Algeria's first quadrennial periodic report (2019-2020). He also assisted Mauritania, Qatar and Oman as an international expert in the same exercise. Salim was a regional evaluator for the UNESCO-Aschberg Programme in the MENA region before joining the EU-UNESCO Bank of Expertise in 2023. Salim holds a doctorate in general medicine from the Faculty of Algiers, a Master's degree and a research Master's degree in music and musicology from Sorbonne University, as well as several American certifications in project management.

ALEJANDRA LÓPEZ GABRIELIDIS

Alejandra López Gabrielidis is a philosopher and researcher specialized in art and digital technologies. Her research focuses on the new modalities of corporeality that emerge in relation to the phenomenon of datification, exploring the interaction between data and the body from an approach of distributed agentiality and cognition. She currently works as coordinator of the Doctoral Unit and professor of Aesthetics and Theory of the Arts in the degrees of Design and Fine Arts at BAU, University Centre of Arts and Design in Barcelona. She is also currently collaborating with UNESCO on issues related to digital technologies in the culture sector. She has worked as a postdoctoral researcher in the Technopolitics Unit of the CNSC (Communication Networks and Social Change) Group at the Internet Interdisciplinary Institute (IN3) of the Universitat Oberta de Catalunya (UOC) and as the co-coordinator of the Sociotechnical Conceptualization Vector. In addition to her research work, she has translated works of authors such as Franco "Bifo" Berardi and Katherine Hayles.

BRENDAN CIECKO

Brendan Ciecko is the founder and CEO of Cuseum, a software company that helps hundreds of leading museums, cultural attractions and mission-driven organizations engage their visitors, members and patrons. Ciecko has been building technology since the age of 11 and has been recognized by Inc. Magazine as being one of America's top young entrepreneurs. Ciecko has been featured in The New York Times, WIRED, Fast Company, Entrepreneur, TechCrunch, VentureBeat, Esquire and PC Magazine for his work in design, technology and business. Recently, Ciecko was inducted to the inaugural Forbes "Next 1000" list, named "New Innovator" by Artnet, included on Blooloop's top 50 "Museum Influencer" list and named a "Entrepreneur Of The Year" finalist by EY. He is also a Webby Award winner and holds 8 patents in the area of mobile technology.

KIM JEONG HAN

Kim Jeong Han is an artist whose work lies at the intersection of cognitive science and contemporary art. His practice explores hybrid perception, the 4E cognition framework (which emphasizes embedded, embodied, enactive and extended aspects of cognition) and complex issues related to the eye and mind. By adopting an interdisciplinary approach that merges art and science, Kim creates works that challenge and expand traditional understandings of perception. Recently, Kim has collaborated with the National Museum of Modern and Contemporary Art in South Korea to develop an inclusive, barrier-free art appreciation programme tailored for the visually impaired. This project aims to make art more accessible by rethinking the ways in which art can be perceived beyond sight. Kim's international experience is extensive. With support from the Rockefeller Foundation's Asian Cultural Council, he participated in the Lower Manhattan Cultural Council's prestigious artist residency programme in New York City. Additionally, he was a Fulbright visiting scholar at the Centre for Digital Arts and Experimental Media (DXARTS) at the University of Washington, Seattle. His artworks have been showcased in renowned exhibitions, including "Infosphere" at ZKM in Karlsruhe, Germany, the International Media Art Biennale Media City Seoul and Whitebox in New York City, among other global exhibitions. Kim holds a Ph.D. in cognitive science from Seoul National University and an MFA from the School of the Art Institute of Chicago, institutions that have shaped his dual expertise in both art and cognitive science. His research and artistic practice focus on exploring how humans perceive the world and how this understanding can be expanded through hybrid art forms. He also actively contributes to international discussions on the digital environment's impact on cultural diversity as an expert for UNESCO's Reflection Group on the Diversity of Cultural Expressions in the Digital Environment (2024). Currently, Kim serves as a professor in the Department of Painting at Seoul National University, where he continues to push the boundaries of art through both his teaching and his interdisciplinary projects.

JOE KALLAS

Joe Kallas is an architect and cultural heritage specialist with extensive experience in disaster response and heritage preservation. As a CIPA Heritage Documentation expert member (ICOMOS/ISPRS ISC), he has led pioneering digitization efforts using photogrammetry, notably after the 2020 Beirut explosion, where his work enabled rapid emergency interventions and restoration planning. Currently serving as a UNESCO International Expert for Culture, Joe leads the Rapid Damage and Needs Assessment of Ukraine's Cultural Sector, heavily impacted by the ongoing war. He has also contributed to post-disaster assessments in Türkiye and Syria following the 2023 earthquake, helping to safeguard endangered heritage. Joe is also deeply engaged in capacity building, training local professionals in Lebanon, Ukraine, Iraq and the United States on the use of digital tools to expedite damage assessment and cultural recovery. His training focuses on empowering communities to lead their own heritage preservation efforts through technology. His research combines AI, machine learning and 3D point clouds to streamline structural assessment of historic buildings in post-disaster contexts. He also develops predictive models and dimensionality reduction techniques to identify vulnerabilities in unreinforced masonry buildings, supporting data-informed retrofits that improve resilience against future disasters.

LETHABO HUMA (YOUTH REPRESENTATIVE)

Lethabo Huma (b. 1998) is a South African digital artist from Pretoria, celebrated for her expressive digital paintings that serve as a visual diary of her emotions and life experiences. Initially trained in traditional art, she transitioned to digital mediums in 2018. Huma's work often focuses on Black bodies, addressing underrepresentation while exploring themes of beauty and identity. Her notable pieces include Gogo (Grandmother) and Me, showcased in an NFT group exhibition at Christie's titled Proof of Sovereignty and The Self, displayed in Sotheby's Natively Digital exhibition. She has

also collaborated with 40 artists for TIME magazine to envision a better future. Currently, Huma is pursuing a degree in visual multimedia at the University of South Africa to further develop her expertise in New Media.

MERCEDEZ BUNZ

Dr Mercedes Bunz is Professor in Digital Culture and Society at the Department of Digital Humanities, King's College London. She studied Philosophy, Art History and Media Studies at the FU Berlin and the Bauhaus University Weimar, Germany. In 2009, she came to London as the Technology Reporter of The Guardian but returned to an academic career thereafter. At King's College London, Mercedes Bunz co-leads the Creative AI Lab, a collaboration with the Serpentine Galleries founded in 2019. Research for her last book on smart technology and AI was presented to UK Parliament. Since 2022, one major research is 'PublicAI' and the role of data collections. Bunz is a member of the Public AI Network – Infrastructure for the Common Good.

OCTAVIO KULESZ

Octavio Kulesz is a philosopher, digital publisher and director of Teseo, one of Latin America's leading electronic publishing houses. As an expert collaborating with international organizations including UNESCO, OIF, IFACCA and the International Alliance of Independent Publishers, his research focuses on issues related to cultural diversity and creative industries in the digital age. Some of his articles, such as "Culture, Platforms and Machines" (UNESCO, 2018), presciently anticipated the contemporary challenges associated with the impact of generative artificial intelligence on the cultural sectors.

OJOMA OCHAI

Ojoma Ochai is the managing director of CcHUB - Africa's largest innovation centre which supports and invests in technology and creative entrepreneurs and innovators to promote African economic prosperity. She is also a co-founder of CcHUB's Creative Economy Practice. She is a member of the UNESCO Global Expert Panel on the 2005 Convention on Cultural Expressions and as part of this role, she has delivered global research and advisory support to state parties on emerging technologies (including AI) in the global creative industries. She is a member of UNESCO's Global Reference Group on Diversity of Cultural Expressions in the Digital Environment - supporting the development of frameworks for supporting the sector in the age of technologies like AI. Ms Ochai is also co-chair of the Microsoft and UNDP Reference Group on AI for Development to help shape prospective AI opportunities in Nigeria. As a Rockefeller Bellagio Centre Resident in 2023, she undertook research in the Responsible AI and Data track, focusing on the impact of emerging technologies like AI and Blockchain on Creative Economy policy and practice in Africa. Her almost 20 years of experience spans International Cultural Relations and leading Creative and Digital Economy projects. Her previous roles have included being Regional Director for British Council Sub-Saharan Africa Arts and Creative Economy Programme and other roles working on projects for institutions like the Swedish Arts Council, World Bank and various national governments to support the development of the global Creative Economy. She sits on various creative and technology organization boards, including the board of Trust (a trust set up by musician and entrepreneur Jay Z and Jack Dorsey - CEO of Block Inc. and co-founder and former CEO of Twitter, to support Bitcoin development in Africa and other locations), Africa No Filter (a narrative change organization funded by a collective of donors including Ford Foundation, Luminate and Bloomberg) and Pixel Ray Studios (a global film infrastructure development company).

RAMON LÓPEZ DE MANTARAS (OBSERVER)

Ramon Lopez de Mantaras. Research Professor (Emeritus) of the Spanish National Research Council (CSIC) and Honorary Professor of Western Sydney University. Founder and former director of the Artificial Intelligence Research Institute (IIIA). Electrical Engineer from Mondragon University (Spain), Master of Sciences in Computer Science from the University of California Berkeley, PhD in Physics from the University of Toulouse (France) and PhD in Computer Science from the Technical University of Barcelona. A pioneer of Artificial Intelligence in Spain, with contributions, since 1976, in Pattern Recognition, Approximate Reasoning, Expert Systems, Machine Learning, Case-Based Reasoning, Autonomous Robots and AI & Music. Author of nearly 300 papers. Invited plenary speaker at numerous international conferences. Former Editor-in-Chief of Artificial Intelligence Communications, editorial board member of several top international journals. Fellow of the European Association for Artificial Intelligence. Co-recipient of five best paper awards at international conferences. Recipient, among other awards, of the Earle C. Anthony Award, UC Berkeley in 1987, the "City of Barcelona" Research Prize in 1981, the "2011 American Association of Artificial Intelligence (AAAI) Robert S. Engelmore Memorial Award", the "2012 Spanish National Computer Science Award" of the Spanish Computer Society, the "2016 Distinguished Service Award of the European Association of Artificial Intelligence", the "2017 IJCAI Donald E. Walker Award" of IJCAI and the "2018 National Research Award in Mathematics and ICT" of the Spanish Government. Member of the "Institut d'Estudis Catalans" (Catalan Academy of Sciences and Humanities). He serves on a variety of panels and advisory committees for public and private institutions based in the USA and Europe on AI related issues.

ROMAN LIPSKI

Roman Lipski is a Polish-German painter based in Berlin, known for his evocative landscapes and video installations that blend realism and abstraction into enigmatic compositions. In 2016, he co-developed Artificial Muse, an AI-driven tool that enhances artistic creativity. Instead of replacing intuition, Lipski used AI as a collaborative partner, generating compositions that he reinterpreted and refined. This process redefined human-machine interaction in art, influencing discussions at Google, Volkswagen and TUM. Since 2019, Lipski has explored Quantum Blur, a technique developed with IBM Research-Zurich that manipulates images using quantum computing. His work continues to push digital aesthetics by integrating emerging technologies. His works have been exhibited at the Julia Stoschek Foundation in Berlin, the National Art Museum of China in Beijing, ZKM, Karlsruhe and the Museum of Fine Arts, Boston. Currently, Lipski expands his practice by applying AI and quantum computing to textiles, film and print, redefining creativity at the intersection of art and technology.

SHREY MAURYA (YOUTH REPRESENTATIVE)

Shrey Maurya (she/her) is a writer, researcher and curator based in New Delhi, India. Shrey holds a bachelor's in Political Science from Lady Shri Ram College, Delhi University, a master's in Visual Art from Ambedkar University, Delhi and a diploma in South Asian Painting from Jnanapravaha, Mumbai. Her research interests include miniature painting, handloom textiles, 17th-18th century botanical illustration, as well as jewellery, perfume and cultures of adornment in the Indian subcontinent. In 2020, Shrey set up the MAP Academy, an organization that develops and provides open-access resources on the art and cultural histories of South Asia. She serves as the MAP Academy's research director and manages its Special Projects, which includes grants, fellowships and exhibitions amongst other initiatives. She is presently working on an exhibition Ticket Tika Chaap — The Art of the Trademark in the Indo-British Textile Trade, due to open at the Museum of Art & Photography (MAP), Bengaluru in March 2025. She is also co-editor (with Nathaniel Gaskell) of a forthcoming book with the same title, to be published concurrently with the exhibition.

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