SHIFT

MetamorphoSis of cultural Heritage
Into augmented hypermedia assets
For enhanced accessibiliTy
and inclusion

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EXECUTIVE SUMMARY

This Deliverable describes the ethical and social requirements of the SHIFT toolkit. This elaboration has been based on the review of applicable regulations and normative documents in four intersected domains: digital accessibility, AI, data protection and cultural heritage. With visitors' accessibility as the central axis of the analysis, we have established the main by-design and default requirements to be considered in developing SHIFT technologies. This legal framework has been contrasted through an illustrative presentation of four adoption cases belonging to the project validation in Romania, Germany, Hungary and Serbia. This analysis provides some elements concerning the local specifics to be considered in the SHIFT tools' implementation. At the same time, it demonstrates a high level of alignment in the generation of national standards on privacy protection and AI fairness, which facilitates industrial development and prospects for future deployment. Lastly, the document examines how key trade-offs and legal tensions between privacy and accessibility or AI-based accessibility and explainability could be interpreted and addressed in the process of technological adoption.

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Abbreviations and Acronyms

Abbreviation / Acronym	Description
GDPR	General Data Protection Regulation
AI	Artificial Intelligence
COO	Concept of operations
D	Deliverable
EU	European Union
ML	Machine Learning

Glossary of terms

Terminology	Description
Machine Learning	*Machine learning is a subfield of artificial intelligence that gives computers the ability to learn without explicitly being programmed*[1].
Computer Vision	*Field of artificial intelligence in which programs attempt to identify objects represented in digitized images provided by cameras*[2].
Personal data	*Personal data are any information which are related to an identified or identifiable natural person (Art. 4 (1) GDPR).*
Sensitive data	*Personal data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, or trade union membership, genetic data, biometric data for the purpose of uniquely identifying a natural person, data concerning health or data concerning a natural person's sex life or sexual orientation (Art. 9 GDPR).*
Pseudonymized data	*Personal data in such a way that the data can no longer be attributed to a specific data subject without the use of additional information (Article 4(5) of the GDPR)*

[1] See at: https://mitsloan.mit.edu/ideas-made-to-matter/machine-learning-explained
[2] See at: https://www.britannica.com/technology/computer-vision

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1. INTRODUCTION

1.1. Objectives

SHIFT is an EU-funded project within the Horizon Europe framework, addressing the topic HORIZON-CL2-2021-HERITAGE-01: ***Preserving and enhancing cultural heritage with advanced digital technologies***. It began on the 1st of October 2022 and will finish on the 30th of September 2025. The project is strategically conceived to deliver loosely coupled technological tools that offer cultural heritage institutions the necessary impetus to stimulate growth and embrace the latest **innovations in Artificial Intelligence (AI)**. Machine learning, multi-modal data processing and digital content transformation methodologies will be used in this context. SHIFT also expects to provide enhanced technologies for heritage institutions based on semantic representation, linguistic analysis of historical records, and haptics interfaces to effectively and efficiently communicate new experiences to all citizens, including people with disabilities.

Collectively, the project will release **12 technology solutions clustered into five thematic areas**: computer vision, audio, text-to-speech, haptics, semantics and linguistics. As mentioned above, these tools will support accessibility and inclusion by design to overcome the shortcomings and limitations of the Culture and Creative Industries (CCI) sector in enabling growth, stimulation and social participation.

The **development of SHIFT tools** will be carried out in **close consultation** with the user communities represented in the project. The two Culture and Heritage (CH) networks (BMN, ANBPR) will launch open consultations to aggregate views from their members. Then, together with the cultural heritage institutions (SOMKL, SMB) and heritage professionals (Heritage Management), they will provide requirements based on the cultural assets being maintained within each organisation. Lastly, SHIFT will validate the diversity of digital media transformation and the semantic formalisation tools for the culture across each museum and library.

The **usability, efficiency** and inclusion of **by-design principles** adopted within the project will be evaluated by CH networks and vulnerable group partners (DBSV), who will engage with the various tools developed in the project. In addition to the stakeholders and end-users, the SHIFT project also brings together leading industrial (SIMAVI) and academic institutions (FORTH, UAU, QMUL). The consortium is complemented by SMEs (MDS, AUD) with high-tech product development teams and ethical expertise (ERC).

SHIFT is divided into **seven Work Packages**. This document is the third deliverable within Work Package 1, "*SHIFT user requirements analysis for Cultural*

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Heritage accessibility and inclusion", and is based on work carried out in Task 1.5, "*Ethics and legal aspects regarding SHIFT end-user evaluation"*. In the Grant Agreement, Task 1.5 is described as follows:

> ***T1.5 Ethics and legal aspects regarding SHIFT end-user evaluation*** *(Leader: ERC, Contributors: SOMKL, ANBPR, SMB, BMN, HERITΛGE, DBSV; M1-M12): Platforms managing cultural and historical heritage data entail many ethical and legal challenges. On the one hand, compliance with data protection regulations has to be guaranteed by design, so new technological systems protect privacy rights. On the other hand, collecting, classifying, and releasing heritage-related information can affect human integrity or other rights. For instance, when automated systems take biased or opaque decisions or in cases when certain groups (i.e., visually disabled people) are excluded from systems access and enjoyment. Taking this into account, a thorough revision of the legal framework on data protection and heritage management in Europe will be carried out, including relevant national case studies. In this way, this task will identify and frame the requirements and principles that should guide the proposed solution (WP2-5), both in terms of its technical challenges as well as in terms of supporting cultural organizations to develop appropriate management strategies. The review of the applicable legal framework will not be limited to the mere enumeration of legal texts and requirements that are relevant for the proposal. Instead, ERC will spot all the most salient requirements and precepts and apply them to the reality of SHIFT subsystems and research project to ensure legal compliance. In order to frame the scope, adaptability and desirability of the system, relevant EU case studies and jurisprudence in this domain will be examined. The second section of the deliverable will be oriented towards operationalizing the above legal requirements for responsible research during the SHIFT project development, including informed consent, equal treatment, and privacy*.

The above Task outcomes will be reflected in **Deliverable 1.3: SHIFT end-user ethics and legal framework (ERC, Report, M12).** This report will specify the ethics and legal framework regarding the evaluation of the SHIFT technologies with end users (including individuals with disabilities). The document is PUBLIC and will be used by all members of the SHIFT consortium.

1.2. Problem definition, scope and methodology

Following the above approach, this deliverable seeks to set the **main legal and ethical requirements** to be considered by technical partners when developing SHIFT solutions. It also offers recommendations for cultural heritage sites and spaces and for cultural policymakers to adopt new solutions aimed at enhancing accessibility in this domain. The normative analysis starts by acknowledging that inclusion by-design technologies aimed at cultural services, new apps to monetize cultural heritage content or translation technologies based on AI can also result in adverse outcomes such as data breaches or algorithmic bias. Along these lines, this deliverable provides relevant legal and ethical frameworks and requirements, **setting main constraints and potentials** to consider when designing these

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systems and also a theoretical understanding of central issues related to SHIFT technologies.

The document is based on a **comprehensive documentary analysis** of relevant legal documents, grey literature and scientific studies. Moreover, to provide actionable recommendations, relevant Deliverables and the project case studies have been provided in Section 3. These case studies have been built through collaboration with end users taking part in the project to understand better how to translate legal requirements into actionable outcomes for the SHIFT project.

The legal framework has been built considering four legal and analytical dimensions that set boundaries for implementing SHIFT solutions: **cultural policies, data protection, AI and digital accessibility**. The Deliverable provides a comprehensive review of primary documents to be considered in this regard at the EU level. It also contrasts this overall framework by analysing four case studies from Serbia, Hungary, Romania and Germany to grasp the national specifics and scenarios arising from local contexts. Case study analysis is not a complete examination of national scenarios but is limited to **illustrating potential differential aspects and legal constraints** to be considered in the process of integrating SHIFT technologies in concrete cultural heritage contexts. Based on this, the Deliverable provides a taxonomy of critical constraints and specific requirements to be considered by both developers and implementers of SHIFT systems. Such components are presented in the form of analytical input concerning trade-offs between each applicable principle derived from technological adoption (for instance, privacy and accessibility) and concrete recommendations. It should be noted that ethical aspects mentioned in the above Task description concerning SHIFT-responsible research have been addressed in Deliverable 5.3, so D1.3 could gain internal coherence.

1.3 Structure of the report

After the Introduction in Section 1, this Deliverable includes:

- Section 2, legal framework addressing cultural policy, data protection AI and digital accessibility.
- Section 3, case study illustration through the study of cultural heritage validation exercises in Serbia, Hungary, Romania and Germany.
- Section 4, conceptual and transversal examination of analysis outcomes, considering privacy, AI fairness and desirability registers.
- Section 5 provides overall conclusions.

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2. SHIFT normative framework: legal requirements and ethics principles on cultural heritage, data protection, AI and digital accessibility

This section will identify and examine the four main EU regulatory and normative frameworks to be considered in developing SHIFT technologies. This includes, firstly, the specific laws and relevant normative documents from the EU institutions concerning **heritage and culture** protection and management. Secondly, **EU data protection law** and its intersections with studied technologies aimed at mediating access to cultural heritage, therefore impacting personal identifiers' management. Thirdly, **AI normative standards, norms and documents** applicable to the SHIFT domain and technologies. Lastly, specific EU regulations and strategies aimed at tackling **digital accessibility**.

These documents are examined to **identify and understand** those requirements to be considered in designing systems connecting visitors and users and heritage or cultural institutions. In this framework, particular attention is paid to EU institutions' mandates concerning accessibility to culture and the use of technology as a basis for the inclusiveness of all citizens. In this way, the analysis of standards, principles and legal requirements is guided by the main project's intersectional variable concerning fair and equative **accessibility to cultural heritage**. In this regard, the Deliverable will consider the grounds behind the United Nations (UN) Convention on the Rights of People with Disabilities[3], which entered into force in 2011, the EU disability strategy and other relevant documents, such as the Marrakesh Treaty[4]. The overall approach seeks to properly consider the cultural rights of people with disabilities and other social groups excluded from cultural access, such as the elderly.

2.1 EU culture and heritage regulation: relevant regulatory frameworks and requirements for SHIFT

This section aims to present the main elements of the cultural heritage regulatory framework and identify its evolution, not only in terms of strengths, conditions and limitations. Instead, we also seek to address the connection between the different instruments and analyse the requirements for the SHIFT project from a holistic perspective. International and **EU legislation on heritage and culture** is presented in three sub-sections, each dedicated to the central regulatory instruments. First, the UNESCO Convention on the protection and promotion of the

[3] See at: https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities/convention-on-the-rights-of-persons-with-disabilities-2.html
[4] See at https://www.wipo.int/wipolex/en/treaties/textdetails/13169

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diversity of cultural expressions. Second, the Treaty on the Functioning of the European Union. And thirdly, the specific regulation for cultural heritage.

2.1.1. UNESCO Convention on the protection and promotion of the diversity of cultural expressions

The UNESCO *Convention on the Protection of the Diversity of Cultural Expressions*[5] supports four main axes: **governance for culture, flows and mobility, sustainable development and Human Rights**. Adopting this Convention in 2005 was considered a milestone in international cultural policy because of the cultural but also economic nature of cultural expressions. In the latest regard, it may be seen as a driver of the creative economy perspective and the Creative and Cultural Industry (CCI). This double social and economic approach is at the heart of the digital transformation strategies with which the SHIFT project is working.

Ultimately, it should be noted that the Convention recognizes the **sovereign right of States** to maintain, adopt and implement their own national cultural policies while supporting governments and civil society in resolving the ongoing challenges. In this regard, it is aligned with the EU principle of subsidiarity. In addition, the Convention is committed to informed, transparent and participatory governance systems for culture. The UNESCO Convention mentions its commitment to cultural governance systems based on **foundation, transparency and participation** in the preservation and accessibility of cultural heritage, for instance, through its Art 2, Principle 7, on **Equitable access**. Still, one of its major criticisms is the narrow scope for doing so by not specifying specific lines of action.

2.1.2. Treaty on the Functioning of the European Union

Together with the Treaty on European Union (TEU), the **Treaty on the Functioning of the European Union**[6] (TFEU) forms the constitutional basis of the EU. Its name has been changed twice. Originally, the Treaty of Rome, signed in 1957, and it was renamed the Lisbon Treaty in 2007. Since then, it has kept the current name of Treaty on the Functioning of the European Union. From the very beginning, the treaty defines a secondary role of the EU in the area of culture.

> Article 3 (3): the European Union "*shall respect the richness of its cultural and linguistic diversity and shall ensure the safeguarding and development of the European cultural heritage*".

[5] See at: https://unesdoc.unesco.org/ark:/48223/pf0000246264?posInSet=1&queryId=85dde93e-9ef6-402b-bc9f-452e6a399382
[6] See at: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:12012E/TXT:en:PDF

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Article 6, in the section entitled "*Categories and areas of competence of the Union*", different actions can be undertaken by the EU to "*support, coordinate or complement the action of Member States*". Culture is one of these policy areas.

In both articles, it can be seen that for the EU, culture remains an area that complements the action of the Member States. Therefore, there is **no harmonization** of cultural legislation established at the inter-state level.

However, an article that made a difference in the evolution of the cultural sector was Article 186, which emphasizes the cultural support, **coordination and complementarity** of joint actions between Member States and European cultural heritage. For instance, Article 128 of the Maastricht Treaty of 1992 (later Article 151 in the Treaty of Amsterdam) on transnational exchanges between cultural institutions states:

"The Community shall contribute to the flowering of the cultures of the Member States, while respecting their national and regional diversity and at the same time bringing the common cultural heritage to the fore".

* Texts underlined in citations are from the authors

This Article represents the starting point of European cultural policy system integration. In order to consolidate a European cultural area, the aim is to promote cooperation between State Members and, if necessary, to supplement their cultural action. The EU should also promote cultural diversity through the promotion of joint cultural policies.

In other words, following the principle of **subsidiarity**, the TFEU sets out the roles of Member States in developing their own cultural policies. Still, in the meanwhile, it addresses the common challenges of the EU, such as the impact of digital technologies, the need to remunerate artists on digital platforms and the prioritization of innovation in the Cultural and Creative Sectors (CSS). The European Union's scope of action is limited since it must respect the sovereignty of its Member States and only indirectly infer into their cultural policies through cooperation. In sum, while there has been an evolution towards the promotion of supranational instruments in cultural heritage policies, the Work Plan for Culture 2023-2026 continues to reflect, albeit to a lesser extent, the **principle of subsidiarity** as set out in the Maastricht Treaty. Following Jean-Pierre Danthine (1993), the subsidiarity principle of the Maastricht Treaty lacked precision in terms of application, beyond being a political principle. In 2017, the author states that the disenchantment towards the EU, materialized in the recent crises, is precisely due to the failed application of this application. In this sense, he claimed that the problem of institutional design of the EU project continues to be perpetuated[7].

"Today, as in the 1990s, Europe's deep-seated institutional design problem is tied to the inevitable trade-off between efficiency-enhancing centralisation and democracy-

[7] As we will see in the next sections, the same problem applies in AI.

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enhancing sovereignty. If the trade-off that Europe has chosen cannot be explained and justified to citizens, consequences are unavoidable. The loss of sovereignty can easily turn into a loss of identification with the European project, and, as seen today, the missing identification can generate a dangerous democratic deficit, and a concomitant longing for the autonomy of the nation-state". [8]

From the SHIFT perspective, the above delimitation of cultural competences in the TFEU is supplemented by legal instruments aimed at Member States cooperation in the research domain. Title XIX, entitled *Research and technological development and space*, contains three objectives under Article 179 (ex-Article 163 TEC). First, to **strengthen the scientific and technological bases** for the development of research, scientific knowledge, and technology to circulate freely and develop on competitive terms. Secondly, the EU should encourage the **research and technological development** activity of small and medium-sized enterprises, research centers and universities, as well as their cooperation in the internal market by means of national public contracts, common rules and without fiscal legal obstacles. Thirdly, all the aforementioned actions shall be executed in accordance with the provisions of this title. In short, a substantial change can be perceived here in terms of concretisation of lines of action that we did not see previously in the UNESCO Convention on the Protection of the Diversity of Cultural. In this regard, the SHIFT project is fully in line with these objectives.

Article 180 (former Article 164 TEC), complements these activities managed by the Member States, through:

(a) implementation of research, technological development and demonstration programmes by encouraging cooperation with and between undertakings, research centers and universities;
(b) promotion of cooperation in the field of research, technological development and demonstration in the Union;
(c) promotion of cooperation in the field of research, technological development and demonstration in the Union; and
(d) promotion of the training and mobility of Union researchers in the Union.

Once again, these activities align with the project's objective and the methodology of working in **close and open consultation with technology end users**, including museums, libraries and heritage managers. Indeed, SHIFT is strategically conceived to deliver a set of technological tools which, based on their modularity, allow adaptation to each cultural heritage institution and visitors' needs. Inclusion and engagement concerning visitors and other relevant stakeholders (research entities, curators, etc.) is, therefore, an essential provision.

[8] https://cepr.org/voxeu/columns/subsidiarity-forgotten-concept-core-europes-existential-crisis

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2.1.3. EU regulations, recommendations and policies on cultural heritage accessibility

This section narrows down the legal framework analysis to the cultural heritage domain to address its own specifications in more detail. This will allow us to assess SHIFT technologies from the perspective of end users (museums, heritage sites, etc.) and users (including people with disabilities) from a European legal and ethical framework.

First, it is important to point how the European Commission[9] defines cultural heritage:

> *"A shared source of remembrance, understanding, identity, dialogue, cohesion and creativity. It encompasses a broad spectrum of resources inherited from the past in all forms and aspects. Cultural heritage is tangible (castles, museums, works of art); intangible (songs, traditions, etc.), and digital (born-digital and digitised)*".

This involves a comprehensive approach to historical and cultural heritage, emphasising its potential technological grounds. In addition, cultural heritage is also seen as a **driver for the cultural and creative sectors** (SCC) as a resource for economic growth, employment and social cohesion. In fact, more than 300,000 people work in the cultural heritage sector and 7.8 million jobs are indirectly related to it according to the EC[10].

Once again, while Member States regulate their cultural policies, including cultural heritage policies, the EU's role remains to safeguard and enhance Europe's cultural heritage through policy areas and programmes. Although the principle of subsidiarity still prevails, greater importance is given to the **materialization of participation**, promoting cultural policies based on a participatory approach. A document specifically focused on the development of this approach is the 2018 *Report on Participatory Governance of Cultural Heritage* (European Commission, 2019), which aims to engage with local communities by prioritizing open, participatory and inclusive processes through three clusters of actions for:

a) capitalising on technological tools for innovation on cultural heritage;
b) fostering social innovation; and
c) strengthening skills in the field of cultural heritage.

The EU's strategic framework for cultural heritage is based on the following instruments.

The European Commission Communication of 2014, entitled **Towards an integrated approach to cultural heritage for Europe**[11], early on the

[9] Council conclusions of 21 May 2014 on cultural heritage as a strategic resource for a sustainable Europe (2014/C 183/08).
[10] Data available at https://ec.europa.eu/commission/presscorner/detail/en/IP_17_1111
[11] See at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2014:477:FIN

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introduction mentions that cultural heritage is present in the EU Agenda. Furthermore, it underlines that cultural heritage represents a common wealth and also a common responsibility.

Likewise, as can be seen in point 1.1. entitled "*An asset for all, a responsibility for all*", in contrast to the instruments mentioned above, the cultural heritage assets do not only provide economic growth and jobs, but also social cohesion.

> *"Europe's cultural heritage, both tangible and intangible, is our common wealth - our inheritance from previous generations of Europeans and our legacy for those to come. It is an irreplaceable repository of knowledge and a valuable resource for economic growth, employment and social cohesion".*

In terms of technology, in relation to these last three axes, point 1.3. entitled "*A sector in transformation: heritage as a source of social innovation for smart, sustainable and inclusive growth*" states:

> *"Technology adds economic value in the heritage sector: digitised cultural material can be used to enhance the visitor experience, develop educational content, documentaries, tourism applications and games.*
> *Heritage has great capacity to promote social cohesion and integration, through regeneration of neglected areas, creation of locally-rooted on of neglected areas, creation of locally-rooted jobs, and promotion of shared understanding and a sense of community".*

Along these lines, there can be no sense of community without equitable **accessibility**, the backbone of the SHIFT project. As the EU and all its Member States are parties to the United Nations Convention on the Rights of Persons with Disabilities, it is bound by the general principle contained in Article 9 of the Convention. In addition, in the absence of any explicit exception for cultural heritage sites and museums, the Committee on the Rights of Persons with Disabilities has indicated the following:

> *"The provision of access to cultural and historical monuments that are part of national heritage may indeed be a challenge in some circumstances. However, States parties are obliged to strive to provide access to these sites. Many monuments and sites of national cultural importance have been made accessible in a way that preserves their cultural and historical identity and uniqueness."*

Returning to the possibilities offered by the technologies in this direction, cultural heritage becomes a hybridisation of physical and digital spaces, building many new places and entanglements between them through **digital cultural heritage**, thanks to technologies such as Data Retrieval and Analysis, Artificial Intelligence (AI), 3D reconstruction and visualisation and eXtended Reality (XR)Thus, both digital and hybrid environments revitalise cultural heritage sites, offering a wide range of possibilities. To this end, in 2021 the European Commission created the **Expert Group on a common European Data Space for Cultural Heritage**

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(CEDCHE)[12] to monitor the progress of the Commission's recommendations. One of the most relevant recommendations is the Commission Recommendation of 27 October 2011 on the digitisation and online accessibility of cultural material and digital preservation (2011/711/EU)[13]. This recommendation, already in 2011, was focused on the following areas Digitisation (organisation and funding), Digitisation and online accessibility of public domain material, Digitisation and online accessibility of in-copyright material, Europeana, and Digital preservation.

(6) The online accessibility of cultural material will make it possible for citizens throughout Europe to access and use it for leisure, studies or work. It will give Europe's diverse and multilingual heritage a clear profile on the Internet, and the digitisation of their assets will help Europe's cultural institutions to continue carrying out their mission of giving access to and preserving our heritage in the digital environment.

Furthermore, this recommendation also seeks to optimise the benefits of information technologies for economic growth, job creation and the quality of life of European citizens. These premises are cross-cutting in both European cultural and heritage regulations.

Similarly, in a more concrete and up-to-date manner, the **New European Agenda for Culture** (2018) presents cultural heritage as an economic vector, but also as a vector for social cohesion and even for improving the quality of life and sustainability of the population by fostering participation and social cohesion. To this end, while still governed by the principle of subsidiarity, the role of the EU is based on political and financial support for the Member States. In relation to the **technological innovation** promoted by the SHIFT project, the most relevant point of the Agenda is 5.2. entitled "Digital 4Culture" in which the following is stated:

"The digital revolution enables new and innovative forms of artistic creation; broader, more democratic access to culture and heritage; and new ways to access, consume and monetise cultural content".

For this purpose, the specific actions to be undertaken by the EC are as follows:

Create a network of competence centres across the EU to safeguard knowledge of endangered heritage monuments through large-scale digitisation (2019)
·Create an online directory of European films and launch the first EU Film Week to make European films available to schools across Europe (2019)
·Set up a pan-European network of Digital Creative and Innovation Hubs to support digital transformation (2020)
·Propose next steps for Europeana, Europe's digital platform for cultural heritage (2018)
·Launch pilot mentoring schemes for audiovisual professionals – in particular female ones – to help new talents develop their career paths and abilities (2019)

[12] More information at https://digital-strategy.ec.europa.eu/en/news/expert-group-common-european-data-space-cultural-heritage
[13] See at: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:283:0039:0045:EN:PDF

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·Stimulate cross-overs and collaboration between art and technology for sustainable innovation on industrial and societal levels (2018)

This agenda also announced that a new European Framework for Action on Cultural Heritage will be elaborated with European leaders and cultural stakeholders to concretise actions further. Furthermore, it is the materialisation of the integrated and participatory approach to cultural heritage mentioned above. Accordingly, the **European Framework for Action on Cultural Heritage** (2018) outlined an integrated and participatory approach to cultural heritage in EU Policies. The main EU institutions on cultural actors that support this framework are the **European Parliament** through 2014/21429 (INI) resolution of 8 September 2015[14] and Pilot Projects such as the Jewish Digital Cultural Recovery Project; the **Council of the European Union** through several measures and recommendations to Member States on risk management or participatory governance; and the **Committee of the Regions** through drafts opinions on EU legislative proposals and the promotion of cross-border cooperation authorities; and the **Economic and Social Committee** through opinions on urban and rural cohesion.

The **European Framework for Action on Cultural Heritage** (European Commission, 2019) is the most important updated regulatory instrument at the European level, which reflects the common set-up for heritage-related activities. It proposes around 60 actions implemented by the European Commission in 2019 and 2020, which focus on five main thematic areas/pillars:

(1) Cultural heritage for an inclusive Europe: participation and access for all
(2) Cultural heritage for a sustainable Europe: smart solutions for a cohesive and sustainable future.
(3) Cultural heritage for a resilient Europe: safeguarding endangered heritage
(4) Cultural heritage for an innovative Europe: mobilising knowledge and research
(5) Cultural heritage for stronger global partnerships: reinforcing international cooperation.

In addition, four fundamental principles drive these actions on cultural heritage: a h**olistic approach, mainstreaming/integrated approach, evidence-based policymaking and multi-stakeholder cooperation**. Along these lines, implementing SHIFT technological tools needs to be understood as part of an articulated set of cultural policies aimed at inclusiveness.

[14] See at https://oeil.secure.europarl.europa.eu/oeil/popups/ficheprocedure.do?lang=en&reference=2014/2149(INI)

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2.1.4. EU Work Plan for Culture (2023-2026)

The strategy to support these objectives is through the main *European Commission' Framework, the Creative Europe* program, and other policy actions set out in the Council Resolution on the EU Work Plan, which represent a strategic and dynamic instrument of EU cultural cooperation that addresses political developments on cultural policymaking. After the last three work plans, (2019-2022), (2015-2018) and (2011-2014), the current **Work Plan for Culture 2023-2026**[15] sets out several priority areas, with due regard for the EU principles of subsidiarity and proportionality. Accordingly, Article 1 of Protocol No. 2 establishes the following:

> *"Each institution shall ensure constant respect for the principles of subsidiarity and proportionality, as laid down in Article 5 of the Treaty on European Union".*

It is therefore under these principles that the main goal of the Current Plan for Culture is inscribed: to grow EU values and the European identity through culture, as well as to stimulate the digital transformation to reach a sustainable development through the CCS. Considering the impacts of the Russian war against Ukraine, the COVID-19 pandemic and the climate change, it is focused on freedom of artistic expression and creativity as drivers of cultural diversity and innovation. In this sense, in conjunction with the SHIFT project, the third priority area is particularly relevant, entitled "C*ulture for the planet: unleashing the power of culture*":

> *Culture, including cultural heritage, contributes to the sustainability transformation needed to meet the objectives of the European Green Deal and the 2030 Agenda. In this context, digital technologies also play a key role. Therefore, innovation in the cultural and creative sectors, digital transformation and the accessibility of culture and cultural heritage in the digital space must be further strengthened.*

Therefore, in line with SHIFT technological developments, the 2023-2026 plan promotes the **use of new digital tools to enhance accessibility** to heritage and EU culture in general, placing these goals in the context of the 2030 agenda. In this regard, the SHIFT toolkit must align with **sustainability**, as mentioned earlier, by fostering convergence between broadened public access and reduction of environmental impact.

Overall, as shown in Table 1 below, the cultural and heritage regulations and policies link a series of processes to equative accessibility to cultural heritage, including inters-state cooperation, digitalization, and social participation. These strategic mechanisms are additionally linked to core values such as democracy, sustainability and cultural diversity.

[15] See at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022G1207%2801%29&qid=1671635488811

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Table 1. Summary of cultural heritage regulations requirements

Normative document	Main requirements and principles to be considered in SHIFT
UNESCO Convention	• Accessibility to cultural heritage, Art. 2, Principle 7, on Equitable access
TFEU	• Principle of subsidiarity in cultural policies • Technological cooperation between MS in cultural policies, Article 180
Report on Participatory Governance of Cultural Heritage *(2014)*	• Participation in cultural heritage activation and enjoyment
Towards an integrated approach to cultural heritage for Europe *(2014)*	• Digitalization of cultural heritage to enhance visitors' experience
Commission Recommendation of 27 October 2011 on the ***digitisation and online accessibility of cultural material and digital preservation*** *(2018)*	• Online accessibility of cultural material • Fostering diversity and multilingualism
New European Agenda for Culture *(2018)*	• Using digital technology to promote democratic access to cultural heritage • Monetize cultural heritage through digitalization
European ***Framework for Action on Cultural Heritage*** *(2018)*	• Fostering participation to ensure equitable access to cultural heritage • Promoting technological integration for heritage protection and democratization
EU Work Plan for Culture *(2023-2026)*	• Digital transformation, accessibility of culture and cultural heritage in the digital space to foster democracy and sustainability

2.2 Applicable EU data protection regulation

SHIFT technological tools will process several types of data inputs, from painting images to **museum visitors' data** used to feed and interact with its AI systems. Therefore, some of this data processing will involve sensitive personal identifiers to be used for various purposes, ranging from translating art pieces into didactical visual or text outcomes to detecting users' needs. In this context, a proper **privacy impact assessment** of the SHIFT toolkit subsystems to develop privacy-by-design strategies is essential. This section sets the main applicable data protection requirements to be considered in this process.

Data protection can be defined as the normative framework that defines the rules for processing personal data. This section presents the **data protection principles** relevant to these types of systems and shows how they have been addressed by EU data law. While considering requirements embedded in the

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Convention 108+ and the e-privacy directive, the analysis focuses on the General Data Protection Regulation, which has been used to define the data protection regulation principles that apply to SHIFT solutions.

2.2.1 The General Data Protection Regulation (GDPR)

The full name of the main data protection legislation in Europe is "*Regulation 2016/679 on the protection of natural persons about the processing of personal data and on the free movement of such data and repealing Directive 95/46/EC*". It is otherwise known as the General Data Protection Regulation (GDPR) and replaces the previous regime of European data protection law embodied in Directive 95/46/EC. The main definitions and concepts contained within the regulation are briefed below.

Definitions

Data controllers and data processors:

Article 4 (7): *"'controller' means the natural or legal person, public authority, agency or other body which, alone or jointly with others, determines the purposes and means of the processing of personal data; where the purposes and means of such processing are determined by Union or Member State law, the controller or the specific criteria for its nomination may be provided for by Union or Member State law;"*
Article 4 (8): *"'processor' means a natural or legal person, public authority, agency or other body which processes personal data on behalf of the controller."*

Following the above, it is vital to distinguish the above figures and corresponding obligations as far as compliance with the GDPR is concerned. The data controller bears the bulk of the responsibility in terms of compliance. Instead, the **processor** is also responsible for assisting controllers in complying with the GDPR requirements. Additionally, a joint controller relationship surfaces where two or more controllers jointly determine the purposes and means of processing personal data.

Different governance formats and distribution of the above controllership levels may be defined for the use of SHIFT technologies, given their flexibility, adaptability to various usages and environments and concrete use of personal data in cultural exchanges. Agents in charge of heritage sites, authorities managing museums and government agencies may act as controllers or processors associated with SHIFT systems' personal data.

Personal data:

Article 4(1): *"'personal data' means any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person".*

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In those cases where SHIFT solutions do not capture any of the above direct or indirect identifiers, data protection regulations, together with the requirements to be described below, **do not apply.**

Special categories of personal data

The GDPR defines what sensitive personal data is in Article 9.1 and forbids its processing under normal conditions. Article 9.2 lays down the cases in which the processing of sensitive data can be considered lawful.

Article 9.1

Processing of personal data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, or trade union membership, and the processing of genetic data, biometric data for the purpose of uniquely identifying a natural person, data concerning health or data concerning a natural person's sex life or sexual orientation shall be prohibited.

Article 9.2

Paragraph 1 shall not apply if one of the following applies:

(a) the data subject has given explicit consent to the processing of those personal data for one or more specified purposes, except where Union or Member State law provide that the prohibition referred to in paragraph 1 may not be lifted by the data subject;

(b) processing is necessary for the purposes of carrying out the obligations and exercising specific rights of the controller or of the data subject in the field of employment and social security and social protection law in so far as it is authorised by Union or Member State law or a collective agreement pursuant to Member State law providing for appropriate safeguards for the fundamental rights and the interests of the data subject;

(c) processing is necessary to protect the vital interests of the data subject or of another natural person where the data subject is physically or legally incapable of giving consent;

(d) processing is carried out in the course of its legitimate activities with appropriate safeguards by a foundation, association or any other not-for-profit body with a political, philosophical, religious or trade union aim and on condition that the processing relates solely to the members or to former members of the body or to persons who have regular contact with it in connection with its purposes and that the personal data are not disclosed outside that body without the consent of the data subjects;

(e) processing relates to personal data which are manifestly made public by the data subject;

(f) processing is necessary for the establishment, exercise or defence of legal claims or whenever courts are acting in their judicial capacity;

(g) processing is necessary for reasons of substantial public interest, on the basis of Union or Member State law which shall be proportionate to the aim pursued, respect the essence of the right to data protection and provide for suitable and specific measures to safeguard the fundamental rights and the interests of the data subject;

(h) processing is necessary for the purposes of preventive or occupational medicine, for the assessment of the working capacity of the employee, medical diagnosis, the provision of health or social care or treatment or the management of health or social care systems and services on the basis of Union or Member State law or pursuant to contract with a health professional and subject to the conditions and safeguards referred to in paragraph 3;

(i) processing is necessary for reasons of public interest in the area of public health, such as protecting against serious cross-border threats to health or ensuring high standards of quality and safety of health care and of medicinal products or medical devices, on the basis of Union or Member State law which provides for suitable and specific measures to safeguard the rights and freedoms of the data subject, in particular professional secrecy;

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(j) processing is necessary for archiving purposes in the public interest, scientific or historical research purposes or statistical purposes in accordance with Article 89(1) based on Union or Member State law which shall be proportionate to the aim pursued, respect the essence of the right to data protection and provide for suitable and specific measures to safeguard the fundamental rights and the interests of the data subject.

Therefore, SHIFT must **assess the legal basis for processing the above data and be able to establish proportionate safeguards** for the treatment of the above special categories of personal data. In this regard, organisations processing such categories of data need to keep records of the processing activities. It should be noted that, under specific conditions, special categories of personal data managed by SHIFT could be processed by cultural institutions under public or legitimate interest. However, such a legal basis will need to be properly defined and implemented before data ingestion as part of SHIFT adoption.

Guiding principles

The GDPR is structured around the following **seven main principles**, which must guide SHIFT technological development:

Article 5 (1) a: "*personal data shall be processed lawfully, fairly and in a transparent manner in relation to the data subject ('lawfulness, fairness and transparency')*."

Personal data must be processed based on some circumstances and **following a specific legal basis** established in Article 6 of GDPR: consent, contract performance, a legitimate interest, a vital interest, a legal requirement, and a public interest. In the case of SHIFT, personal data used by heritage institutions might be processed based on **informed consent** in most already identified scenarios, for instance, when visitors purchase cultural services. However, other legal bases may also be used in specific cases. This mainly concerns those systems that, although legally compliant, cannot be subjected to proper informed consent procedures by data controllers. For instance, this may apply to AI-based cameras used to capture data from museums without distinguishing specific data subjects from those not recorded by them.

Article 5 (1) b: *collected for specified, explicit and legitimate purposes and not further processed in a manner that is incompatible with those purposes; further processing for archiving purposes in the public interest, scientific or historical research purposes or statistical purposes shall, in accordance with Article 89(1), not be considered to be incompatible with the initial purposes ('purpose limitation')*

Controllers managing SHIFT solutions must only collect personal data for **specific, explicit and legitimate purposes**. Institutions implementing SHIFT digital tools must clearly state what this purpose(s) is, communicate this goal to data subjects always when possible and only collect data for as long as is necessary to achieve that purpose.

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Article 5 (1) c: *adequate, relevant and limited to what is necessary in relation to the purposes for which they are processed ('data minimisation');*

The personal data collected in the context of the SHIFT technological adoption must be the **minimum required to achieve its purposes**. Criteria and measures implemented by heritage institutions in charge of any data processing tool should ensure that collected personal data is limited to the purposes of the specific tool at hand.

Article 5 (1) d: *accurate and, where necessary, kept up to date; every reasonable step must be taken to ensure that personal data that are inaccurate, having regard to the purposes for which they are processed, are erased or rectified without delay ('accuracy');*

SHIFT solutions data controllers must take every reasonable step to **update or remove inaccurate or incomplete data**. This involves setting the organizational mechanisms aimed at this purpose, such as trained personnel and well-prepared digital systems. All data subjects whose personal data is captured or processed by SHIFT solutions have the right to request that project partners erase or rectify erroneous data concerning them without delay, according to Articles 16 and 17 of GDPR.

Article 5 (1) e: *kept in a form which permits identification of data subjects for no longer than is necessary for the purposes for which the personal data are processed; personal data may be stored for longer periods insofar as the personal data will be processed solely for archiving purposes in the public interest, scientific or historical research purposes or statistical purposes in accordance with Article 89(1) subject to implementation of the appropriate technical and organisational measures required by this Regulation in order to safeguard the rights and freedoms of the data subject ('storage limitation');*

SHIFT systems must allow data controllers to **delete personal data when they no longer need it**. The concrete retention period/s to be established is not fixed by law. Instead, it must be determined on a case-by-case basis, considering the nature of the processing and its purposes. In other words, the retention period needs to be justified on the **grounds of its utility** for achieving a specific purpose. For instance, personal data for visitors may be used to enhance accessibility to heritage spaces and not required for any additional goals (I.e., cultural organization's logistics). Data can only be held if it serves the purpose for which it was collected in the first place.

Article 5 (1) f: *processed in a manner that ensures appropriate security of the personal data, including protection against unauthorised or unlawful processing and against accidental loss, destruction or damage, using appropriate technical or organisational measures ('integrity and confidentiality').*

Following this requirement, SHIFT data controllers must **keep personal data managed by its systems safe**, secure and protected by using appropriate

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technical and/or organisational measures. For instance, this includes the use of encryption for data storage.

> **Article 5 (2)**: *The controller shall be responsible for, and be able to demonstrate compliance with, paragraph 1 ('accountability').*

Lastly, following the above requirement, SHIFT data controllers must follow the GDPR but also be able to explain and **demonstrate compliance**. In this regard, SHIFT implementers should ensure tracking and data registering mechanisms are in place to support transparency and visitors' rights.

Other relevant principles and requirements

Data Protection Impact Assessment (DPIA)

Article 35 GDPR establishes the conditions under which a DPIA must be carried out.

> **Article 35**
> *1. Where a type of processing in particular using new technologies, and taking into account the nature, scope, context and purposes of the processing, is likely to result in a high risk to the rights and freedoms of natural persons, the controller shall, prior to the processing, carry out an assessment of the impact of the envisaged processing operations on the protection of personal data. A single assessment may address a set of similar processing operations that present similar risks [...]*
> *3. A data protection impact assessment referred to in paragraph 1 shall in particular be required in the case of:*
> *a)systematic and extensive evaluation of personal aspects relating to natural persons which is based on automated processing, including profiling, and on which decisions are based that produce legal effects concerning the natural person or similarly significantly affect the natural person;*
> *b)processing on a large scale of special categories of data referred to in Article 9(1), or of personal data relating to criminal convictions and offences referred to in Article 10; or*
> *c)systematic monitoring of a publicly accessible area on a large scale.*

Section 5 below evaluates the ethical risks linked to processing personal data in SHIFT and gives a general opinion about the need for a data protection impact assessment as described.

Pseudonymisation and anonymisation of data

According to Article 26 of the GDPR, the **principles of data protection do not apply to anonymous information**. This is information which does not relate to an identified or identifiable natural person or to personal data rendered anonymous in such a manner that the data subject is no longer identifiable, directly or indirectly. Therefore, the GDPR does not concern processing such anonymous information, including for statistical or research purposes.

Since GDPR does not apply to anonymous information, it is crucial to distinguish between anonymized and **pseudonymized data**. Pseudonymized data is data that

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can no longer be attributed to a specific data subject without the use of additional information (Art. 4 (5) GDPR). While anonymization processes ensure that no information about individuals can be recovered from a dataset, pseudonymization involves the replacement of a value, usually an identifier (an attribute that identifies the individual to whom it refers directly, for example, name), by another value to render it more challenging to re-identify. Following this principle, pseudonymizing personal data should ensure that additional information can be kept separately. It should also be subjected to technical and organizational measures to ensure that the **personal data are not attributed to an identified or identifiable natural person**. Many authors have underlined the limitations of pseudonymization techniques in some contexts, as individual records can be re-identified due to various de-anonymization attacks (Lubarsky, 2017; Article 29 Working Party, 2014[16]). This means that, under certain technical circumstances, data relying on pseudo-identifiers could be turned into identification data. Along these lines, Article 28 of the GDPR states the following:

> *"The application of pseudonymisation to personal data can reduce the risks to the data subjects concerned and help controllers and processors to meet their data-protection obligations. The explicit introduction of 'pseudonymisation' in this Regulation is not intended to preclude any other measures of data protection."*

Following this risk mitigation approach, SHIFT systems are expected to provide pseudonymization and anonymization methods by design in all those cases where applicable. This should be assessed on a case-by-case basis when these techniques align with data security and data subjects' rights to rectification and information.

Data security

Two data security articles must be considered following the above preventative approach:

- Article 32: "Security of processing". This article aims to ensure that the data controller and the data processor process and keep the data security to avoid data being destroyed, lost, altered, disclosed or accessed accidentally or unlawfully. Along these lines, SHIFT cultural heritage institutions must ensure that data is kept securely.
- Article 25: "Data protection by design and by default", including pseudonymization and data minimization procedures. This article establishes that, after performing a contextual analysis of the risks that the processing can cause, appropriate data protection measures must be put in place. This means that cultural organizations must implement data management plans derived from applicable risk assessments.

Automated individual decision-making, including profiling

[16] Opinion 05/2014 on Anonymization Techniques adopted 10 April 2014 by the Working Party Article 29. Available at: https://www.pdpjournals.com/docs/88197.pdf (accessed 28/08/2018).

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Following Recital 71 which mandates that data subjects "*should have the right not to be subject to a decision"*, Art. 22 GDPR address automated decisions and mandates:

> 1. *The data subject shall have the right not to be subject to a **decision based solely on automated processing**, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her.*
> 2. *Paragraph 1 shall not apply if the decision:*
>   a. *is necessary for entering into, or performance of, a contract between the data subject and a data controller;*
>   b. *is authorised by Union or Member State law to which the controller is subject and which also lays down suitable measures to safeguard the data subject's rights and freedoms and legitimate interests; or*
>   c. *is based on the data subject's explicit consent.*
> 2. *In the cases referred to in points (a) and (c) of paragraph 2, the data controller shall implement suitable measures to safeguard the data subject's rights and freedoms and legitimate interests, at least the right to obtain human intervention on the part of the controller, to express his or her point of view and to contest the decision.*
> 3. *Decisions referred to in paragraph 2 shall not be based on special categories of personal data referred to in Article 9(1), unless point (a) or (g) of Article 9(2) applies and suitable measures to safeguard the data subject's rights and freedoms and legitimate interests are in place.*

This restriction on the use of automated systems and associated data subjects' rights must be considered in SHIFT design and deployment since they involve specific mechanisms to withdraw automation in those cases required.

Table 2. Summary of data protection regulations requirements

Requirement and article	Applicability in SHIFT and operationalization
***Roles,** Chapter IV (especially Article 28)*	• Processors must be adequately identified. • Also, the relationship between them and the controllers has to be regulated through a contract that includes privacy and data protection clauses. Overall, controllers must ensure that processors are compliant with the GDPR
***Special categories of data,** Article 9*	• Special categories of data must be identified and processed following procedures that set-in place additional safeguards
***Principles,** Article 5*	• Data protection principles of Lawfulness, Fairness, and Transparency; Purpose Limitation; Data Minimisation; Accuracy; Storage Limitations; Integrity and Confidentiality; and Accountability must inform the development of the different tools in SHIFT
***Informed consent,** Article 7*	• The processing of personal data within the SHIFT toolkit should be carried out almost exclusively on the basis of informed consent, which involves active affirmative action from visitors/users

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Rights of data subjects, *Articles 12-22*	• The rights of the data subjects must be ensured by communicating their existence to the research participants before they consent • Also each organisation's DPO needs to have the necessary resources for ensuring that the research participants rights are respected at all times
Anonymisation, *Recital 26*	• Data subjects cannot be recognised in order for a data set to be considered anonymised. Anonymisation could apply to specific data processing in SHIFT, for instance, concerning systems identifying individuals but aimed at detection (i.e. sensors)
Security, *Arts 1,f and 4.12*	• Personal data collected by SHIFT tools must be processed securely according to the risks created by them. Possible security measures during the processing phase range from the above encryption to systems for access control
Automated individual decision-making, profiling, *Article 22*	• SHIFT institutions must provide mechanisms to respond to the right not to be subjected to automated processing and decisions
Data breach, *Articles 33, 34*	• Controllers must follow the procedures established in the GDPR when detecting a data breach, including applicable notifications within 72 hours (or nationally defined timeframes)
Data Protection by Design and by Default, *Article 25*	• The system Controller has to implement technical, **organisational and security measures** so as to comply with data-protection principles, respect the rights of the data subjects and meet the requirements of GDPR in an effective manner. This has to be done both at the time of definition of the means for processing and at the time of the processing itself. Besides, this has to take into account the state of the art, cost of implementation and the nature, scope, context and objectives of the data processing.
Record keeping, *Article 30*	• Controllers and processors processing sensitive categories of personal data need to keep records of their processing activities

The above-summarized principles and requirements need to be **operationalized into specific measures and protocols** to be implemented by cultural institutions. For instance, images and videos of visitors can have particular data protection issues and should be reviewed carefully before being made public. Such information must be particularly protected. This is especially the case if the image or voice of an individual who has not consented to use the system is inadvertently captured. Moreover, all data collected through the system are only to be used for the stated purposes and visitors should not feel pressured to supply personal or

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sensitive information that they do not wish to share. Only data which is absolutely necessary for the functioning of the system are to be collected.

All data collected, stored, processed and retrieved by the SHIFT tools should be held and transferred through highly secure systems to prevent loss, damage or unauthorized access. These systems should only be based outside the EU if absolutely necessary.

Users of cultural institutions with SHIFT-installed systems should be **able to opt out** of collecting personal and sensitive data about them. They should also be notified of the parties to whom the data may be transferred, the conditions for transferring the data to third parties, and the rights of the individual (data subject) concerning further processing of their personal data. In this regard, rights to access their data from the system, to rectify it, if needs be, change their mind and withdraw any personal data should be guaranteed to visitors.

2.3 The EU AI regulatory law: framework and implications

This section will outline the primary EU standards and legal requirements framing the **integration of AI into cultural heritage** accessibility solutions. The use of this technology in the European cultural heritage domain is growing fast, following the trend of other sectors and impacting processes ranging from cultural production to dissemination and consumption (Kulesz, 2018). AI technologies are being used for **several purposes** in the art and heritage fields, including AI generation of art pieces -or part of them- (Taurino, 2023; Jboor et al., 2019), the identification of theatre plays authorship[17], the automation of accessibility tools to translate heritage sites into audio or text materials to allow further enjoyment (Díaz-Rodríguez & Pisoni, 2020) or the LIAR based detection of archaeological sites[18]. Furthermore, archiving initiatives such as Europeana or the "Time Machine" by Frédéric Kaplan are using datasets that may be available for future AI-based projects, for instance, concerning protocols to reach a larger audience. It has been pointed out that AI can foster cultural diversity by allowing people to discover a wide variety of content (Caramiaux, 2020) and institutions to digitalize and protect tangible and intagible heritage (Li, 2021). One example of AI implementation in the heritage domain is using AI technologies to enhance accessibility within the Anne Frank House in Amsterdam[19]. The institution has developed a chatbot, a messenger-like app with which visitors can interact in order to have instantaneous and personalised answers to visitors' questions about the museum. Other ones are the Van AbbeMuseum in the Netherlands and Chateau d'Oiron in France, which use robots to support information provision and the physical autonomy of visitants.

[17] See example at: https://eadh.org/projects/read
[18] See example at: https://www.zooniverse.org/projects/evakap/heritage-quest/about/research
[19] See at: https://www.annefrank.org/en/about-us/news-and-press/news/2017/3/21/anne-frank-house-launches-bot-messenger/

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While legal requirements to be followed by these developments in Europe are mostly framed from the above data protection perspective, **concerns about AI-based discrimination** and other exclusionary effects of access automation not directly related to personal identification are gaining importance. In parallel, normative frameworks on AI fairness and social impact are becoming more complex and stricter. These frameworks are, therefore, to be aligned with new AI fairness models and requirements promoted by governments and regulatory institutions in the EU. Various Commission's General Directorates (DGs), agencies and other bodies are addressing this domain. They include the frameworks produced by Directorates General for Communications Networks, Content and Technology (DG CONNECT), Justice and Consumers (DG JUST), the EU Agency for Cybersecurity (ENISA), the Fundamental Rights Agency (FRA) or the above-cited European Data Protection Supervisor (EDPS). Primary standards impacting SHIFT development and implementation in Europe are discussed below, together with a problematization of AI fairness in this context based on an updated literature review.

2.3.1 European Institutions general approach to AI fairness

The European Union has launched several regulatory and normative initiatives concerning AI in the last five years. In this regard, there is an ongoing discussion between the European Parliament[20], aligned with the OECD approach to algorithmic processing (OECD, 2019) and a more flexible definition of high-risk systems, and the European Commission approach, reflected in the European strategy on AI (see AI Act proposal below). Along these lines, the Commission has already proposed to **ban unacceptable risk** systems and set a systematic list of requirements for those classified as high risk. This perspective was reflected in the *"Ethics guidelines for trustworthy AI and policy"* (2019)[21]. Instead, European Parliament resolutions have addressed AI-related issues in the domain of safety, transparency, bias and discrimination, and several cultural domains, among others. The Parliament has pointed out the need for common EU rules on AI, following a human-centric perspective.

Before outlining the main legal requirements concerning the use of IA technologies in the cultural heritage domain, we will introduce some of the EC and EP studies in this area. In 2022, the European Commission published the document "*Opportunities and challenges of artificial intelligence technologies for the cultural and creative sectors".* The focus of the study is the systematic identification of **AI potentiality and usage** across the whole Cultural and Creative Sectors (CCS)

[20] See at https://www.europarl.europa.eu/legislative-train/theme-a-europe-fit-for-the-digital-age/file-regulation-on-artificial-intelligence
[21] Associated investment recommendations were reflected by the High-Level Expert Group on AI (AI HLEG) set up in 2018.

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and the analysis of risks arising from these technological adoption processes. Policy recommendations for both policymakers and private cultural organizations are provided on this basis from a perspective of plural and fair implementation of AI in these sectors within the EU. The document states that:

> "*Artificial Intelligence and machine learning has the potential to support societal transformations. It can for example improve accessibility for people with disabilities. Although these technologies could help to improve some of the challenges for the nearly 90 million Europeans living with a disability, continued initiatives to create a barrier-free society would still be needed.*" (European Commission, 2022: 33).

The report provides several examples in this regard, including the requirements embedded in the European Union (Directive 2019/882, 2019)[22] concerning the need to **adapt libraries** to make their digital content accessible to persons with print disabilities (European Commission, 2022: 93). Along these lines, the document also underlines that AI is already being used to facilitate accessibility in **audience engagement** activities. Examples include systems automatically gathering systematic data about the topic or enabling consumption in creative industries using avatars or virtual assistants (European Commission, 2022: 114).

With respect to the heritage field, illustrative examples addressed are AI-enhanced online exhibitions, the use of a chatbot in museums and robots used to interpret artworks in a foreign language. The document also identifies **critical challenges** for integrating AI technology into EU museums and cultural heritage spaces. Such integration is generally defined as weak. Based on fieldwork analysis, the study lists the main challenges detected for modifying this scenario:

- heritage organizations' reticence in using these systems,
- lack of awareness about their benefits,
- concerns about their implications in terms of algorithmic bias and about data quality and copyright,
- lack of personal and economic resources with skills to adopt and manage such systems (European Commission, 2022: 147).

In terms of recommendations, the report points out the need to: i) "*Foster the use of common metadata standards in the museums and heritage sector, raise further awareness*", targeted to Industry National/regional support programmes (e.g. Europeana), ii) "*Support projects for AI experimentation that help collaboration between cultural organisations, startups and practitioners*" and "*Put in place a voucher scheme that can help to test some of the available tools*" both targeted to EU policy and National/regional incentives, and iii) "*Support and enable connections between startups and organisations active in this sector, targeted to the Industry*" (European Commission, 2022: 152).

[22] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019L0882

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The Parliament has also published different state-of-the-art ideas concerning the use of AI in the context of heritage, which are directly connected to SHIFT goals. These documents also outline how the above-cited human-centred approach to algorithmic processing aligns with specific issues. The document (2023) *"Artificial intelligence in the context of cultural heritage and museums"*[23] alerts about the increasing utilization of AI in heritage and museum contexts. It also describes several purposes for its adoption, ranging from archaeological research to 3D digitalization. Moreover, it states: *"AI technologies could also improve the accessibility of the cultural heritage, in particular for people with disabilities"* (Magdalena, 2023:5). In this scenario, the document frames those policies required for smoothing integrating such technologies in these contexts while mitigating their potential negative consequences. These measures include **investment in infrastructure, trained human resources** able to monitor AI fairness and resolve copyright new emerging challenges.

As we can see, the above recommendations are clearly **aligned with SHIFT** purposes and also point out some of the **challenges concerning AI integration** into the cultural heritage domain, such as poor awareness about the implicit risks of the process by cultural institutions. Beyond the above work conducted at the EU level and before describing the primary normative documents at the EU level, it should be stated that, under the **principle of subsidiarity**, the EU policy framework on AI will be importantly determined by legal initiatives and policies carried out by Member States. Many governments are developing their own legislation along these lines. As for other policy domains, it is expected that this may create a fragmentation of the internal market with specific requirements per country impacting the circulation of services and goods. This could also harm legal assurance for suppliers and users.

2.3.2 Convention 108 (1981- modernization of the Agreement in 2018)

The Convention Convention 108+[24] modernizes the 1981 Convention for the Protection of Individuals with Regard to Automatic Processing of Personal Data and sets the standards on rights to privacy and data protection of individuals. The convention includes strong requirements regarding the **proportionality and data minimisation principles**, the lawfulness of data processing, extends the types of sensitive data to genetic and biometric data as well as ethnic origins, and requires greater accountability of data controllers among others.

Convention 108+ has some explicit references to "automated decision making". Article 9 (1a) provides that individuals **should not be subjected to a decision**

[23] See at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/747120/EPRS_BRI(2023)747120_EN.pdf

[24] See at https://rm.coe.int/convention-108-convention-for-the-protection-of-individuals-with-regar/16808b36f1

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that affects them based solely on an automated processing of data without having their views taken into consideration. Further, Article 9 (75 Littera a) grants the rights to individuals who may be subject to automated decision to challenge such a decision. In particular, it provides that data subjects should have the opportunity to substantiate the possible inaccuracy of the personal data before it is used, the irrelevance of the profile to be applied to their particular situation, or other factors that will have an impact on the result of the automated decision.

Finally, Article 9 (77 Littera c) entitles data subjects to know the **reasoning underlying data processing**, including the consequences of such reasoning, which leads to any resulting conclusions, particularly in cases involving the use of algorithms for automated decision-making, including profiling. For instance, in the case of visitor-targeted historical interpretation based on AI, they should be entitled to know the logic underpinning the processing of their data, resulting in a determination, and not simply the outcome itself. Understanding these elements contributes to effectively exercising other essential safeguards, such as the right to object and complain to a competent authority.

2.3.3 The Ethics Guidelines for Trustworthy AI (2019)

Written by the High-Level Expert Group on AI (AI HLEG), this advisory document sets out a framework for achieving Trustworthy AI in the EU[25]. According to the report, AI systems should be 1) lawful by respecting all applicable laws and regulations, (2) ethical by respecting ethical principles and values, and (3) robust, both from a technical perspective while taking into account its social environment. The Guidelines focus more on the ethical component of trustworthiness than on the legal aspects and defines seven requirements for trustworthy AI as follows:

I) **Human agency and oversight**: AI systems should empower human beings and respect their rights. Informed consent is presented as a critical method for achieving this, together with proper oversight mechanisms of AI systems. According to the report, this can be achieved through human-in-the-loop, human-on-the-loop, and human-in-command approaches.

II) **Technical Robustness and safety**: Guidelines call for AI systems to be resilient and secure by integrating mechanisms such as backups and data quality assurance systems, monitoring and enabling accuracy, reliability and reproducibility.

III) **Privacy and data governance**: Following the GDPR, the text asks for adequate data governance mechanisms with a particular focus on data quality and access control.

[25] See at https://www.aepd.es/sites/default/files/2019-12/ai-ethics-guidelines.pdf

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IV) **Transparency**: The document calls for solid traceability mechanisms to ensure transparency. Providing targeted information for users and end users detailing the system's capabilities and limitations should also enable this.

V) **Diversity, non-discrimination and fairness**: The document calls for an integral, both preventative and monitoring, approach to reducing the risks of unfair bias. Its consequences, ranging from vulnerable groups marginalization to stigma, are stressed. In this framework, the document suggests putting mechanisms in place to boost accessibility and inclusiveness concerning those with disabilities in particular.

VI) **Societal and environmental well-being**: The rationale behind AI systems development and adoption should be based on their potential to benefit all human beings, including forthcoming generations. Environmental impact and sustainability should be considered in this framework.

VII) **Accountability**: Responsibility and accountability for AI systems and their outcomes should also be based on establishing protocols and a technical basis for their auditability. One of the protocols in place to foster this approach is the setting of accessible redress for users and all those interacting with the system.

Ethical principles pointed out in the document are respect for human autonomy, prevention of harm, fairness and explicability (European Commission, 2019: 12). Besides proposing a preventative approach towards AI technologies, the report outlines mechanisms for the "*Algorithms, data and design processes*" to be accountable (European Commission, 2019: 19). The need for **internal and external auditability** is associated with the by-design capacity of the system functioning and outcomes to be explicable for users and end users. Ongoing documentation and reporting are therefore places as a key aspect of the engineering process to be facilitated to cultural organizations by SHIFT. Moreover, trade-offs between efficiency and group protection should be logically **reported to users**. The AI system should not be used when there is no acceptable trade-off and when a harmful impact happens, the individual should receive adequate redress.

When discussing fundamental rights that should be considered in AI development and implementation, the Guidelines highlight cultural aspects of the principle "*Respect for human dignity", by stating: "AI systems should hence be developed in a manner that respects, serves and protects humans' physical and mental integrity, personal and cultural sense of identity, and satisfaction of their essential needs*" (European Commission, 2019: 10). Furthermore, concerning specific ethical principles, the document associates the "*Principle of respect for human autonomy"* with *"AI systems* ***should not unjustifiably subordinate****, coerce, deceive, manipulate, condition or herd humans. Instead, they should be designed to augment, complement and empower human cognitive, social and cultural skills*." (European Commission, 2019: 12). In this way, an empowering component is

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attached to AI, which can be seen as a tool for supporting the inclusion of protected groups and minorities also in the cultural heritage field.

2.3.4 Proposal for an Artificial Intelligence Act (2021)

In April 2021, the European Commission (EC) proposed the Artificial Intelligence Act[26] as the EU regulatory framework, with harmonised rules on artificial intelligence, including requirements and obligations for AI Systems, after analysing the estimated risks. The forthcoming EU AI Act will provide a framework for risk-based AI systems, but challenges remain in defining AI systems and autonomy. Compliance with the final act, expected to be adopted near the end of 2023, will be highly challenging for both developers and users.[27]

The AI Act is mainly designed around risk and rights-based perspectives, meaning that it is focused on protecting citizens' data protection rights by assessing the potential of AI systems to affect their rights negatively. According to the EC, the objective of this instrument is twofold. On the one hand, to **generate trust** so EU citizens can adopt AI-based solutions. Such a task should be based on European values and fundamental rights in order to bring more welfare. Along these lines, it proposes a human-centric approach to overcome the challenges and concerns raised using AI. On the other hand, and more practically, it is the response to the request of the European Parliament and the European Council to take legal action to ensure the proper development of an internal market with **harmonized rules for AI systems**, addressing not only the risks but also the benefits related to AI.

Title I of the Act defines the **subject matter** of the regulation and the scope of application of the new rules that cover the placing on the market, putting into service and use of AI systems. It also sets out the definitions used throughout the instrument. Article 3(1) of the draft defines 'artificial intelligence system' as follows:

> *"software that is developed with [specific] techniques and approaches and can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with".*

Therefore, the Act will clearly apply to SHIFT tools adoption. Along these lines, the scope of the Act is broad, addressing systems developed with any of the approaches in Annex I: machine learning, logic and knowledge-based, statistical or Bayesian. The subjects to obligations under the Act are **mainly "providers"**

[26] See at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52021PC0206
[27] Some ISO standards regarding ML are under development, with only a few approved, such as ISO/IEC 23053:2022 (Framework for ML-based systems) and ISO/IEC TS 4213:2022 (Assessment of ML classification performance), and others addressing unwanted bias and data quality governance

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who develop an AI system to place it on the market or place it into service under their own name or brand (Art. 3). **SHIFT developers** must thus consider the proposed legal text as a reference. However, it should be noted that the Act also obliges '*users*', defined as those '*using an AI system under its authority*'. Within this definition, we could have a local cultural policy authority or museum putting in an automated hiring system. Moreover, obligations also target EU importers and distributors concerning produce safety monitoring (Articles 26–28).

The AI Act proposes to implement a risk-based framework to govern AI. AI systems of **unacceptable risk will be prohibited**. These include some systems using **subliminal techniques** (Art. 5.1, a), manipulation, social scoring (Art. 5.1, c) and biometrics. **High-risk systems** that could harm safety or fundamental rights are subject to several specific governance requirements and detailed certification regimes. Limited-risk systems, exhaustively defined in Title IV (Article 52), including chatbots, emotion recognition systems or systems generating deepfakes, are subjected to transparency requirements. Lastly, systems defined as minimal-risk systems will be encouraged to follow codes of conduct respectively. Examples of these systems are spam filters or AI-enabled video games.

Another relevant set of requirements concern **data quality and data governance** (Art. 13), focusing on the quality of the data used to build AI systems and includes. This includes rules about how training sets (as validation and testing datasets) must be designed and used. The approach tackles potential error and discrimination generated by partial, erroneous or historically biased data. In this regard, according to the Act, the datasets must be "*relevant, representative, free of errors and complete*", taking into account the intended purpose. Also, requirements regarding "annotation, labelling, cleaning, enrichment and aggregation" and "*formulation of relevant assumptions [about] the information that the data are supposed to measure and represent'; and 'examination in view of possible biases*'.

Regarding **human oversight** (Art. 14), also developed as part of the above Ethics Guidelines for Trustworthy AI, the Act calls for systems to be designed and developed in such a way that they can be '*effectively overseen by natural persons during the period in which the AI system is in use*'. This is associated with transparency or explanation of how the AI system 'works', as discussed in the context of Articles 22 and 13–15 of the GDPR, and also involves the setting of a 'human overseer' to spot anomalies, become aware of 'automation bias', be able to correctly interpret the system's outputs and be able to override or disregard the system. Explicitly, one aim is to prevent or minimise risks to fundamental rights (Art. 14, 2), which should be integrated into day-to-day protocols used by cultural organizations adopting AI.

2.3.5 European Parliament resolution on AI in education, culture and the audio-visual sector (2021)

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The Artificial intelligence in education, culture and the audiovisual sector European Parliament resolution of 19 May 2021 on artificial intelligence in education, culture and the audiovisual sector (2020/2017(INI)[28]is another component to be considered in the SHIFT normative framework.

This Resolution stresses the importance of AI for the **preservation, restoration, documentation, analysis, promotion and management** of the tangible and intangible cultural heritage. Following the above human centric-approach and recognizing Article 21 of the Charter prohibiting discrimination, the text stresses that "*culture plays a central role in the use of AI technologies at scale and is emerging as a key discipline for cultural heritage thanks to the development of innovative technologies and tools and their effective application to respond to the needs of the sector*".

Accordingly, its Observations (5) reiterate:

> *"the importance of developing quality, compatible and inclusive AI and related technologies for use in deep learning which respect and defend the values of the Union, notably gender equality, multilingualism and the conditions necessary for intercultural dialogue, as the use of low-quality, outdated, incomplete or incorrect data may lead to poor predictions and in turn discrimination and bias; highlights that it is essential to develop capabilities at both national and Union level to improve data collection, safety, systematisation and transferability, without harming privacy; takes note of the Commission's proposal to create a single European data space"*

Several concrete aspects concerning the management of tangible and intangible heritage are addressed in this context, including the need for AI monitoring and examination of the **changes occurring to cultural heritage** sites due to climate change, natural catastrophes and armed conflict, the **AI-based creation of knowledge** on cultural heritage objects, or the deployment and use of AI in customs screening procedures. Moreover, it indicates (Ak):

> *"AI technologies may have the potential to benefit special needs education, as well as the accessibility of cultural and creative content for people with disabilities; whereas AI enables solutions such as speech recognition, virtual assistants and digital representations of physical objects; whereas digital creations are already playing their part in making such content available to people with disabilities."*

The Resolution also assigns other roles in enabling cultural access, such as **reducing the digital divide**. However, it also points out that this should be done by ensuring that inequities are not evident in the process, focusing on aspects such as socioeconomically vulnerable areas (25). Along these lines, the Resolution also stresses (54):

> *"that good practices in AI technologies for the protection and accessibility of cultural heritage, in particular for people with disabilities, should be identified and shared between cultural networks across the Union, while encouraging research on the various*

[28] See at: https://www.europarl.europa.eu/doceo/document/TA-9-2021-0238_EN.pdf

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uses of AI to promote the value, accessibility and preservation of cultural heritage; calls on the Commission and the Member States to promote the opportunities offered by the use of AI in the CCSI;"

Overall, the Resolution perfectly aligns with the SHIFT approach to digital accessibility to cultural heritage.

2.3.6 Council of Europe Revised zero draft [framework] Convention on Artificial Intelligence, human rights, democracy and the rule of Law (2023)

As stated in ins Article 1, the Convention is aimed at establishing *"certain fundamental principles, rules and rights aimed at ensuring that design, development and application of artificial intelligence systems is fully consistent with respect for human rights, the functioning of democracy and the observance of rule of law".* The Convention has a broader scope than previous normative texts. After proving a broad definition of AI systems Art. 2 (more than the AI Act), covering functions such as *"prediction, planning, classification, pattern recognition, organisation, perception, speech/sound/image recognition, text/sound/image generation, language translation, communication, learning, representation, and problem-solving",* the document presents as obligation subject to *"any natural or legal person".*

Article 3 – Principle of non-discrimination, points out:

The implementation of the provisions of this Convention by the Parties shall be secured without discrimination on any ground such as sex, gender, sexual orientation, race, colour, language, age, religion, political or any other opinion, national or social origin, association with a national minority, property, birth, state of health, disability or other status, or based on a combination of one or more of these grounds.

Article 5 – Obligations relating to public authorities, indicates:

"Each Party shall, within its respective jurisdiction, ensure that: a. the application of an artificial intelligence system substantially informing decision-making by a public authority in the exercise of its function, or any private entity acting on its behalf, is fully compatible with its obligations to respect human rights and fundamental freedoms as guaranteed under its domestic law or under any relevant applicable international law;"

Specific references to the protection of fundamental rights and respect for democratic institutions are made. These include the preservation of individual freedoms, human dignity and autonomy and the need to facilitate access to public debate. Chapter IV provides a framework for the main principles to be followed in applying AI, which is aligned with the above instruments. **Equality, antidiscrimination, privacy, accountability, transparency, safety and liability** are some of the rights developed (Arts. 12-16). In this framework, specific references are made to the need for parties, within its jurisdiction and in accordance with its domestic law, to ensure proper redress mechanisms for persons with disabilities concerning AI systems (Art. 20).

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As we can see below, the EU has established a comprehensive set of legal and policy instruments addressing the management of AI systems in cultural heritage contexts. Following recent recommendations of the EC and EP reports, these documents provide a series of frameworks to improve accessibility for people with disabilities to cultural enjoyment, foster the use of common metadata standards, support projects for AI experimentation and boost tech-based accessibility through infrastructure and human resources training.

Table 3.Summary of AI regulations and standards requirements

Normative document	Main requirements and principles to be considered in SHIFT
Convention 108 *(1981-modernization of the Agreement in 2018)*	• Proportionality and data minimisation • Lawfulness of data processing • Protection of sensitive data • Accountability of data controllers • Individuals not being subjected to a decision that affects them based solely on an automated processing • Information on basis of automated processing
Ethics Guidelines for Trustworthy AI *(2019)*	• Human agency and oversight • Technical Robustness and safety • Privacy and data governance • Transparency • Diversity, non-discrimination and fairness • Societal and environmental well-being • Accountability • Explicability and information • Respect for human dignity • Respect for human autonomy

Proposal for an Artificial Intelligence Act *(2021)*	• Risk-based classification of AI systems aimed at preventing and monitoring AI bias
	  ○ Unacceptable risk concern systems using subliminal techniques, manipulation, social scoring and biometrics
	  ○ High-risk systems are those than could harm safety or fundamental rights. Subjected to several specific governance requirements and detailed certification regimes
	• Data quality and governance
	• Human oversight

European Parliament ***resolution on AI in education, culture and the audio-visual sector*** *(2021)*	• AI for the preservation, restoration, documentation, analysis, promotion and management of the tangible and intangible cultural heritage • Equality, multilingualism and intercultural dialogue • Prevention of discrimination and bias • AI based creation of knowledge • Accessibility of cultural and creative content for people with disabilities

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	• Reduction of the digital divide
***Convention on Artificial Intelligence**, human rights, democracy and the rule of Law (2023)*	• Non-discrimination • Accountability of public authorities and institutions concerning their AI systems • Individual freedoms • Human dignity • Autonomy • Equality • Privacy • Transparency, safety and liability • Proper redress mechanisms for persons with disabilities

2.4 Digital accessibility for people with disabilities

All EU Member States have ratified the UN Convention on the Rights of Persons with Disabilities (UNCRPD). These countries have also ratified and are executing its optional protocol (2019). This entails that they must protect the rights of persons with disabilities recognized by the Convention. Such normative standard has also been reflected in several legal documents and standards, including the *Strategy for the Rights of Persons with Disabilities 2021-2030*. This section will summarize the most relevant documents to be considered by SHIFT in this framework.

2.4.1 Directive (EU) 2016/2102 on the accessibility of the websites and mobile applications of public sector bodies

The Directive (EU) 2016/2102, also known as the European Web Accessibility Directive, outlines critical requirements for enhancing the **accessibility of websites and mobile applications** of public sector bodies within the European Union (EU). The Directive applies to websites and mobile applications of government agencies, ministries, municipalities, and other publicly funded organizations. The Directive seeks to set standards for making public sector websites and mobile applications more accessible and to harmonize varying standards within the EU. This should help reduce barriers for developers of accessibility-related products and services while allowing EU citizens, especially those with a disability, to achieve more straightforward access to public services, including museums or historical heritage sites.

In terms of specific requirements, the accessibility standard is set out in the harmonised European standard EN 301 549 v3.2.1 (2021-03). The parts of this standard that are relevant to this directive are listed in Annex A of the standard. Public sector websites and mobile apps must conform to the Web Content Accessibility Guidelines (WCAG) 2.1 at the AA level. WCAG sets the **international**

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standard for web accessibility and ensures that digital content is perceivable, operable, understandable, and robust (Art. 6). Moreover, following Article 7, public sector bodies must provide an **accessibility statement** on their websites or apps. This statement should explain the level of compliance with accessibility standards, describe any inaccessible content, and provide contact information for users to request accessible alternatives.

Concerning associated data management, Member states are required to establish **monitoring mechanisms** to ensure compliance (Art.8). Public sector bodies must **regularly evaluate their websites and apps** for accessibility and report the results to the competent authority. Additionally, public sector bodies must establish a mechanism for users to submit complaints and feedback regarding accessibility issues. They are also obliged to respond to these complaints within a reasonable timeframe. Public sector staff involved in developing and maintaining websites and apps must **receive training on accessibility and usability** (Art. 7, 4).

As for exemptions, while the directive aims for broad accessibility, it recognizes that some content may be exempt due to **disproportionate burden** or technical constraints (Art. 5). However, such exemptions must be justified and explained in the accessibility statement. This directive does not apply to public service broadcasters or non-governmental organisations that do not provide services that are essential to the public or specifically to people with disabilities, and to a list of contents detailed in the law.

2.4.2 European Accessibility Act (2019)

The European Accessibility Act (EEA) (Directive 2019/882) aims to improve the **accessibility of a wide range of products and services** for people with disabilities across the European Union. The EAA applies to various products and services, including computers and operating systems, smartphones, ATMs, ticketing and check-in machines, e-books, e-commerce, banking services, public transport, and more (Art. 2). Covered products and services must comply with specific accessibility requirements detailed in the EAA. These requirements are designed to make the products and services more usable by people with disabilities.

Article 4, establishes the scope of Accessibility requirements as follows:

> *1. Member States shall ensure, in accordance with paragraphs 2, 3 and 5 of this Article and subject to Article 14, that economic operators only place on the market products and only provide services that comply with the accessibility requirements set out in Annex I.*
> *2. All products shall comply with the accessibility requirements set out in Section I of Annex I.*
> *All products, except for self-service terminals, shall comply with the accessibility requirements set out in Section II of Annex I.*

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3. Without prejudice to paragraph 5 of this Article, all services, except for urban and suburban transport services and regional transport services, shall comply with the accessibility requirements set out in Section III of Annex I.
Without prejudice to paragraph 5 of this Article, all services shall comply with the accessibility requirements set out in Section IV of Annex I.
4. Member States may decide, in the light of national conditions, that the built environment used by clients of services covered by this Directive shall comply with the accessibility requirements set out in Annex III, in order to maximise their use by persons with disabilities.
5. Microenterprises providing services shall be exempt from complying with the accessibility requirements referred to in paragraph 3 of this Article and any obligations relating to the compliance with those requirements.
6. Member States shall provide guidelines and tools to microenterprises to facilitate the application of the national measures transposing this Directive. Member States shall develop those tools in consultation with relevant stakeholders.
(…)

The Act sets several **mandatory accessibility features** (Annex 1), which should be considered by SHIFT. Manufacturers and service providers must ensure that their products and services incorporate them. These features address aspects like perceivability, operability, and understandability for people with disabilities. For instance, when the product uses colour to convey information, "*indicate an action, require a response or identify elements, it shall provide an alternative to colour".*

The EAA establishes common accessibility features that should be present across various product categories (Annex 1, Section 1). For example, text-to-speech functionality should be available on smartphones and ATMs. Moreover, products and services must be designed to work seamlessly with assistive technologies, such as screen readers and braille displays (Annex 1). Lastly, manufacturers and service providers must make accessibility-related **information and documentation available to users** (Annex IV, 2). This includes providing instructions on how to use accessibility features.

While the EAA promotes accessibility, it does allow for some **exceptions** in cases where compliance would be impossible or result in a fundamental alteration of the product or service (Article 4). Manufacturers and service providers may need to report on the accessibility of their products and services. Member states are responsible for monitoring and enforcing compliance with the EAA and can establish penalties for non-compliance to ensure that the EAA's requirements are met.

2.4.3 Union of equality: Strategy for the rights of persons with disabilities 2021-2030

The European Commission adopted the Strategy for the Rights of Persons with Disabilities 2021-2030 (2021). The strategy aims to build an inclusive society that

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values diversity and ensures that **persons with disabilities can fully participate in all aspects of life**. This includes education, employment, healthcare, culture, and social and political activities.

Therefore, promoting accessibility from an integral perspective is a core component of the strategy. This involves ensuring that physical and digital environments, products, and services are accessible to all, regardless of disability. In this way, the Strategy looks forward to fostering their human rights, equal opportunities, and access to participate in society and economy. Overall, the document operationalize these principles into several measures[29] and life spheres aimed at ensuring that persons with disabilities no longer experience discrimination. In particular, policies include:

- **Participation and involvement**: Persons with disabilities should have the opportunity to participate in decision-making processes and have their voices heard in matters that affect their lives.
- **Support for families**: Families of persons with disabilities should receive support to ensure the well-being and inclusion of their family members.
- **Education and training**: Ensuring inclusive and quality education for persons with disabilities is a priority. This includes promoting accessible learning environments and providing the necessary support. In this regard, the Strategy points out: *"As announced in the Digital Education Action Plan 2021-2027, Member States will be supported in securing assistive technologies and in providing an accessible digital learning environment and content"* (European Commission, 2021: 13).
- **Employment**: The strategy aims to improve access to the labor market for persons with disabilities, with a focus on equal opportunities, reasonable accommodations, and combating stereotypes.
- **Healthcare and social services**: Persons with disabilities should have access to quality healthcare services and social support, tailored to their individual needs.
- **Access to justice**: The strategy supports improved access to justice for persons with disabilities, including legal aid and accommodations in legal proceedings.
- **Data and research**: Data collection and research on disability issues are vital for evidence-based policymaking and monitoring progress.
- **External action**: The EU will promote the rights of persons with disabilities globally and support international efforts to improve disability inclusion.

[29] Some flagship initiatives include the AccessibleEU, a knowledge base offering information and best practices for accessibility across sectors or the European Disability Card, which will be aimed at helping persons with disabilities get the proper support when they travel or move to another country in the European Union.

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One of the areas covered by the Strategy is *Improving access to art and culture, recreation, leisure, sport, and tourism* (European Commission, 2021: 20). *Along these lines, the EC will:*

> *"promote and **raise visibility of the art works** by persons with disabilities and strive to make cultural heritage and all art accessible and disability inclusive with support from EU funding such as the Creative Europe Programme. The Commission will also address disability stereotypes, for example in media and film in line with the Audiovisual Media Services Directive which requires that commercial communications respect human dignity and do not include any discrimination, including that based on disability. Moreover, the Commission will assess the availability of printed works for persons with disabilities taking account of the existing EU law.*
> *The Commission will also:*
> - *launch a study evaluating the implementation of Article 30 of the UNCRPD to support Member States in policies to increase the participation of and support to persons with disabilities in sport, culture and leisure activities;*
> - *partner with the International Paralympic Committee to foster inclusion in sport and combat stereotypes;*
> - *further promote the development of accessible tourism notably by cities via the European Capital of Smart Tourism award.*

> *The Commission calls on Member States to*
> - *promote and encourage arts of persons with disabilities and raise awareness making them visible through exhibitions and performances;*
> - *and make more art collections and museums accessible to persons with disabilities."*

Overall, as we can see in the following Table, the EU has established different tools to foster the use of technology to integrate people with disabilities into the cultural domain. It should be noted that the EC has also set precise requirements for developers so they comply with accessibility requirements (standard EN 301 549 v3.2.1). Along these lines, cultural institutions should provide broad accessibility-related information to visitors.

Table 4. Summary of digital accessibility regulations and standards requirements

Normative document	**Main requirements and principles to be considered in SHIFT**
Directive (EU) 2016/2102 on the accessibility of the websites *and mobile applications of public sector bodies*	• Enhancing the accessibility of websites and mobile applications • Implement the accessibility standard is set out in the harmonised European standard EN 301 549 v3.2.1 (2021-03) • Provide an accessibility statement on their websites or apps • Regularly evaluate their websites and apps • Set protocols for receiving and responding complaints • Provide training on accessibility and usability for key staff
European Accessibility Act *(2019)*	• Improve the accessibility of a wide range of products and services for people with disabilities

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	• Integrate mandatory accessibility features (Annex) • Make accessibility-related information and documentation available to users
***Union of equality**: Strategy for the rights of persons with disabilities 2021-2030*	• Promoting accessibility for persons with disabilities • Raise visibility of the art works • Make cultural heritage and all art accessible • Address disability stereotypes • Promote and encourage arts of persons with disabilities and raise awareness making them visible through exhibitions and performances • Make art collections and museums accessible to persons with disabilities

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3. National case studies: SHIFT adoption in Serbia, Hungary, Romania and Germany

This section will examine four national case studies in four European countries to explore the specifics of various implementation contexts for SHIFT and supplement the above legal framework development. Considering the importance of the **subsidiarity principle** for the adoption of SHIFT by local stakeholders, this analysis will be used to illustrate the possible gaps and fits in the relative alignment of SHIFT technologies with specific requirements and goals set by Member States.

Although national cultural and heritage regulations may condition some aspects to be covered by accessibility systems, **AI and data protection** are the most relevant legislative frameworks to consider at the local level. As we saw above, EU cultural heritage and digital accessibility regulations tend to focus on the need for promoting protection, activation and access, which is often replicated at the national level for most types of cultural objects and intangibles. Therefore, in this section, we will examine SHIFT case studies from the perspective of the principal data protection and AI distinctive provisions at the national level to be considered in adopting SHIFT-specific tools in each validation context. In this way, it will not only build hypotheses on required adjustments to reach Member States standards but also provide additional framework for the empirical study of cases.

3.1 Serbia: paintings and modern art

Founded as an independent institution for the preservation of cultural heritage in 1980, the **Homeland Museum of Knjaževac** (Serbia) has an archive of more than 1000 paintings of local or Serbian contemporary and modern artists, 19th and early 20th-century paintings, and 21st-century graphics made by international artists. All of them have been digitized. Moreover, the institution also has more than 2000 archaeological artefacts and objects covering figurines (prehistoric period), statues of deities (antique period), historical figures (20th century, abstract forms (modern), objects (large variety from prehistoric to modern times). Several 3D models of churches and fortresses (photogrammetry and 3D modelling) are part of the archive, among several other resources, including photos, documents and movies.

Led by the BMN (Balkan Museum Network /The Homeland Museum of Knjaževac), this case study is aimed at **augmenting the experience of visitors** in the Homeland Museum of Knjaževac, with an exhibition focused on paintings, icons from the 19th century, and contemporary Serbian paintings using innovative digital tools.

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This case will include the use of **short video clips** with audio captioning, **tactile** descriptions, and audio (visual) and tactile elements for people with sensory impairments and other audience members. Subtitling will be available for **people who are deaf or with hearing impairments**. Also, museum curators will have better support in organizing the exhibition layout/objects in a culturally significant order, with contemporary references. Overall, SHIFT will provide and validate the following tools:

- Tool to enhance Photos / Paintings to Short Videos
- Audio tool – "Video to Speech" capable of interpreting visual stimuli (e.g., actions explained in visual sequences)
- Tool to "Text to Speech" that automatically can provide complementary information regarding the cultural heritage assets (books, paintings, photos)
- Tool that translates physical objects to digital objects and uses haptics to "feel" the objects. To implement haptic interaction with 3D digital tangible and intangible cultural heritage assets, augmenting the Users Experience (UX) with new interaction paradigms that can be used in situ or remotely Tool that translates historical meaning into more contemporary language and for autotagging/ auto-categorization of cultural heritage resources.

As pointed out in D1.1, the above technologies seek to address specific and contextual barriers to accessibility. Firstly, the Homeland Museum requires more flexibility in initiating different thematic exhibitions to attract visitors and boost visitors' engagement. Secondly, its use of digital tools for Cultural Heritage digital content is overall limited to Virtual Reality room and Android Applications.

Data subjects' participation and data processing

- **Visitors** will be recruited based on a set of categories. Their role will consist of evaluating user experience by providing feedback regarding their interaction with various media formats, using Likert-style scales with free text comments.
- **Museum personnel** will be able to easily embellish paintings and photos to attract visitors to thematic exhibitions. These tools can also be used to support online dissemination to "hook visitors" or on-site by displaying them on various screens.
- Museum **curators** will take part in an interview-based evaluation of their perceptions and experiences in organising exhibitions and embellishing content.

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3.1.1 Addressing the Serbian case from SHIFT normative framework

This subsection briefly describes the primary specifics of AI and data protection regulation in Serbia. On this basis, it frames the above technological adoption process considering the potential alignment required before and during technological implementation.

The SHIFT case study in the Serbian data protection framework

In late 2018, Serbia updated its data protection law (no. 87/2018, "DP Law") to better align with the EU General Data Protection Regulation. Although the DP Law entered into force on 21 November 2018, its effective date was postponed until 21 August 2019[30].

Most of the legal design follows the **same approach as the GDPR**, including the distinction and roles of Controller and Processor (Art. 3), data subject rights, regulated remedies, etc. Like the GDPR, the PDP Act distinguishes between Personal Data and Special categories of personal data. It is crucial to bear in mind that sensitive personal data can only be processed with informed consent or under conditions defined by the Law (Art 16).

The main **difference** between both legal documents concerning upper thresholds for **monetary fines** stipulated in the PDP Act are far lower than those in the GDPR (Art. 57). Another relevant specificity is about ways to provide appropriate safeguards and circumvent the prior approval procedure before the Commissioner when transferring **Personal Data to third countries**, which involve specific Serbian Standard Contractual Clauses, adopted by the Commissioner ("Serbian SCC").

The SHIFT case study in the Serbian AI framework

Serbia does **not have a specific AI regulation**. However, on 23 March 2023, the Serbian government adopted "*Ethics Guidelines for the Development, Implementation and Use of Reliable and Responsible AI*"[31] ("Guidelines"), inspired by UNESCO's Recommendation on the Ethics of AI adopted in 2021. The Guidelines aim to prevent AI systems from **endangering or marginalizing people** and their actions. In this context, it seeks to protect the freedom of action, opinion and decision-making. As stated in the *Guidelines*, AI should improve human quality of life. Principles for reliable and responsible AI align with the above EU instruments:

a. **explainability and verifiability**;

[30] See at http://www.ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=109270&p_count=55&p_classification=01

[31] Available at (in Serbian) https://www.ai.gov.rs

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b. **dignity**: AI systems should be subordinated to humans and not visceversa;
c. **"do not harm"**: AI systems should be designed in line with safety and security standards also to mitigate risks of misuse; and
d. **fairness**: AI systems should guarantee equal treatment and non-differential impact concerning protected groups or sensitive categories of individuals (e.g., persons with disabilities).

Inspired by the AI Act, the Guidelines also identify **high-risk AI systems** that should be analyzed and evaluated separately due to their importance and potential to influence people and their integrity. These include, for example, systems in the field of health (particularly systems analyzing genetic and health data) and those for managing critical infrastructure (i.e., water supply, road traffic, gas, heating and electricity).

To ensure compliance with these standards, the Guidelines provide a **self-assessment tool** aimed at assessing AI systems. The tool is expected to be used by developers or users to contrast their relative alignment with the main principles and conditions for reliable and responsible AI systems. The Questionnaire is recommended to be filled out in the earliest stages of creating an AI system, i.e., in the planning phase. By filling out the Questionnaire, the developers may identify areas for improvement and receive insight into already established measures. Each condition contains a list of recommendations that the subject must implement to achieve reliable and responsible AI systems.

3.1.2 National implications of SHIFT technological adoption

The above represents a case of using SHIFT video and audio technology to broaden the access and engagement of visitors to the Homeland Museum of Knjaževac. The use of these solutions for artistic enjoyment involves not only taking into account the impact AI-based systems could have on visitors but also paying specific attention to the **consequences of artistic translations** from the perspective of both end users and curators. In this regard, any of the short video or video-to-speech tools should follow the same standards on data protection as the GDPR, ensuring that the minimum amount of personal data (from visitors, Museum personnel, etc.) for the stated purpose is collected, placing security measures from managing this information (respecting, for instance, the established data retention periods) and adequately informing visitors of any possibility concerning the collecting of personal identifiers. Moreover, considering national standards for AI adoption, the Museum of Knjaževac' authorities are expected to apply the above Ethics Guidelines self-assessment issued by the Serbian government before implementation. Once the risk level of the Museum AI systems has been properly defined, **algorithmic audits** should be adapted to specific hypotheses of bias, for instance, concerning AI translation of paintings. Such translations should respect

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visitors' needs while embedding non-discrimination within AI outcomes associated with artistic narratives and auto-tagging functionalities.

3.2 Hungary: Medicine and pharmacy

Founded in 1802, the **Semmelweis Museum, Library and Archive of the History of Medicine**[32] is a museum that has limited immersive content and no modern, engaging tools (e.g., AR/VR, haptics). The SOM has more than 150 paintings covering scenes from the history of medicine, healing, sickness, epidemics, hospitals in past eras, and portraits of physicians and pharmacists. **None are digitized**. It also has more than 55 sculptures and reliefs of physicians, scientists, or other persons related to medicine and various medical objects. However, these are **not in 3D format**. Additionally, the institution counts more than 140.000 books on the history of medicine and pharmacy, out of which 635 are digitized, together with photos and videos. The institution requires new technologies not only to digitalize its archives but also to dynamize visitors' experiences and engage them.

Led by SOM (Magyar Nemzeti Múzeum – Semmelweis Orvostörténeti Múzeum), an exhibition will be used for SHIFT validation. The project aims to immerse the visitors in the **history of medicine** and let them "feel" how different illnesses have been treated before modern times. This will be achieved using several tools within the project, **haptics** being among them. In particular, his pilot exhibition will test the following tools:

- Tool to enhance Photos / Paintings to Short Videos
- Audio tool – "Video to Speech" capable of interpreting visual stimuli (e.g., actions explained in visual sequences)
- Tool that translates physical objects to digital objects and uses haptics to "feel" the objects. To implement haptic interaction with 3D digital tangible and intangible cultural heritage assets, augmenting the Users Experience (UX) with new interaction paradigms that can be used in situ or remotely
- Tool that translates historical meaning into more contemporary language and for autotagging/ auto-categorization of cultural heritage resources
- Tool that by AI technology presents ancient, medieval and early modern medical practices as used to cure illnesses of various symptoms.
- Another tool presents human anatomy in an interactive digital representation.

Data subjects' participation and data processing

- **Visitors**, segmented by categories (including vulnerable populations), will be provided with tools to "sense" the use of medical devices. They will access a representation of the evolution of medical knowledge, practices, and

[32] More information at https://semmelweis.hu/anatomia/en/anatomy-museum/

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pharmacy issues. They will also evaluate critical aspects of their experience engaging with the exhibition in various media formats, using Likert-style scales with free text comments.

- Moreover, as the second group involved, **curators** will participate in a recorded, interview-based evaluation of their perceptions and experiences in organising exhibitions and embellishing content.

3.2.1 Addressing the Hungarian case from SHIFT normative framework

This subsection briefly describes the primary specifics of AI and data protection regulation in Hungary. On this basis, it frames the above technological adoption process considering the potential alignment required before and during technological implementation.

The SHIFT case study in the Hungarian data protection framework

Data protection is regulated in Hungary through Act CXII of 2011 on the Right of Informational Self-Determination and on Freedom of Information (the "**Data Protection Act**"). The Data Protection Act was amended on 26 July 2018 to implement the modifications of the *GDPR*. The *Nemzeti Adatvédelmi és Információszabadság Hatóság* (NAIH) is responsible for the enforcement of the GDPR and the Hungarian Act 2011/CXII.

Following the NAIH mandates, a local government notary may be involved in verifying the actual occurrences of the data processing activities of a data controller. Elements to be monitored can include the scope of the personal data processed, the means of the processing, and the technical and organisational measures. Other relevant **specifics of the Hungarian regulation** are that the Act establishes enduring confidentiality obligations for data protection officers ('DPOs'). Cultural organizations should adjust the confidentiality clauses of their contracts with their DPOs to ensure compliance. Moreover, according to the Act, the NAIH is entitled to mandate the erasure of certain unlawfully processed personal data *ex officio*, without the data subject's request.

The SHIFT case studies in the Hungarian AI framework

AI is **not specifically regulated** in Hungary. However, there are various laws and official documents concerning the use of algorithms or AI, both explicitly and implicitly. Besides sectorial laws, the National AI Strategy (2020) has established a framework for forthcoming national legislation in conformity with the applicable EU legislative provisions.

The AI Strategy 2020-2030 sets out a regulatory approach towards AI, acknowledging the country needs a specific regulation in this domain. The document calls for developing a systematic framework for regulating data assets. Such a framework should cover aspects such as **rules of registration, AI technology-related legal entity, liability/responsibility** and industry-specific

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rules. The document also indicates that authorities should release and adopt industry ethical standards for AI development, and promotes research and joint development in this area, including partnerships between academia, industry, and government and investment in AI infrastructure, data resources, and technology. Moreover, guidelines concerning education and Workforce development include initiatives to promote AI education and skills development at all levels, from schools to universities and professional training.

3.2.2 National implications of SHIFT technological adoption

Engaging visitors, curators and Semmelweis Museum personnel in using SHIFT video and interactive tools involves processing data to produce personalised recommendations. Specifics of technological adoption in Hungary relate to aspects such as the need to generate **strict protocols for the involvement of the Museum DPO** in overseeing data processing while ensuring confidentiality. Moreover, since health data involves special safeguards and attention in its treatment under EU and national regulation, attention should be paid to narratives and data involved in exhibitions in this regard. Along these lines, the SHIFT implementation should be adapted to the upcoming adoption of AI fairness standards in the country, which involve the development of AI evaluation before adoption and the conducting of post-processing audits.

3.3 Romania: ANPBR libraries

The **National Association of Public Librarians and Libraries (ANBPR)** has over 2800 nationwide member libraries distributed in 41 county branches, with national coverage that can be used to pilot various tools. The libraries collect numerous CH objects, including exhibitions or archives of paintings tackling historical and religious themes, thousands of specialized books and manuscripts, thousands of historical images in digital format covering photos, manuscripts, letters of important Romanian and EU figures and historical events and collections of recordings, on a wide range of audio media records. As part of the project, a general lack of **visitor' engagement** due to limited appealing content has been identified.

Led by the ANBPR in Romania, this pilot aims to support and engage at least **ten member libraries** to revitalize their book collection presentations and descriptions and boost the interest of the digital native generation of European citizens. A novel exhibition on "Romanian history and customs explained to digital natives" will be prepared, encompassing several historical and customs books and motion videos from paintings. The exhibition will use a complex of devices and multi-sensory techniques, accessible inclusively to vulnerable people (audio-video concepts, creative descriptions and 3D exhibits/mock-ups, digital stories projected on mobile devices), producing artistic fusion based on the confluence between different environments and with the consistent support of technology. The "**virtual**

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tour" seen through the lens of a camera will be put in place. As part of this validation activity, the following technologies will be tested:

- Tool to enhance Photos / Paintings to Short Videos
- Tool to "Text to Speech" that automatically can provide complementary information regarding the cultural heritage assets (books, paintings, photos)
- Tool that translates historical meaning into a more contemporary language (e.g. better understanding old languages like Shakespeare) and for auto-tagging/ auto-categorization of cultural heritage resources
- Comprehensive intuitive and accessible tool for all (including individuals with disabilities) multimodal storytelling of cultural heritage assets.

Data subjects' participation and data processing

The main participants are:

- **Visitors** (defined as users),
- Libraries' **employees** (500),
- A **sample of disadvantaged groups** (the unemployed, disabled people, elderly, etc.), young people (500), and minority ethnic groups (300),
- Also, **indirect beneficiaries (audience)** are expected to be involved, including families and friends of the direct beneficiaries, partners and collaborators of the library institutions from the ANBPR's network and public institutions in Romania interested in the SHIFT project implementation area (municipalities, county councils, school inspectorates, schools, etc.).

3.3.1 Addressing the Romanian case from SHIFT normative framework

This subsection briefly describes the primary specifics of AI and data protection regulation in Romania. On this basis, it frames the above technological adoption process considering the potential alignment required before and during technological implementation.

The SHIFT case studies in the Romanian data protection framework

The Romanian data protection framework is aligned with the applicable EU law. Its direct applicability is supplemented by Law 190/2018 on measures implementing the GDPR[33]. The lawful bases for processing personal data, guiding principles (Art 5) and data subjects rights are those set out in the EU General Data Protection Regulation (GDPR).

Regarding the specifics of the Romanian context, the national law does not integrate any specific requirements on data privacy matters in a particular sector. Still some aspects concerning national data protection governance should be pointed out. The National Supervisory Authority for Personal Data Processing

[33] See at https://www.dataprotection.ro/servlet/ViewDocument?id=1685

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(ANSPDCP) is the national authority responsible for enforcing data privacy legislation. The registration of data controllers or processors is not mandatory in the country. Such an obligation existed under the former data privacy regime (Law 677/2001 on protecting individuals concerning the processing of personal data and the free movement of such data[34]). However, it was repealed on 25 May 2018. It should be noted that the ANSPDCP often carries out its inquiries through requests for information sent to the data controller or processor. Thus, **documenting the analysis** carried out for data processing activities is the most reliable way to show compliance with privacy requirements.

The SHIFT case studies in the Romanian AI framework

Romania has not adopted specific laws regarding AI, although it is in the process of establishing its **National AI Strategy**. In 2020, Romania adhered to the provisions set out in the EU Commission's White Paper on AI, which acknowledges the principles set by the High-Level Expert group detailed above (2019), including **human agency and oversight**, technical robustness and safety, privacy and data governance, transparency, diversity, non-discrimination and fairness, societal and environmental wellbeing, and accountability. Furthermore, the above National Strategy provides eight "strategic directions", including undertaking proper consultations with business stakeholders to establish a framework for the responsible use of AI. These standards are currently being discussed by the Romania has a *Scientific and Ethics Council in Artificial Intelligence*, established in May 2023.

3.3. 3 National implications of SHIFT technological adoption

ANPBR libraries address institutions and sectors often delayed in the process of digitalisation and technological mediation. The Romanian normative framework sets a few specific standards for technological adoption and monitoring. In this regard, data protection challenges include the collection of personal identifiers in practices of interactive digital representation or the enhancement of photographs. Moreover, issues with AI fairness concern the way algorithms translate historical meaning or target specific disadvantaged groups in a non-discriminatory manner. When conducting these processes, the Romanian legislation requests the same **data protection standards** detailed above for the GDPR. Pseudonymization, data security in the storage of personal identifiers and the use of security mechanisms to avoid unauthorized access should be in place. Other aspects related to the need for aligning the legal basis for data collection, for instance, informed consent, with robust protocols for data collection. As we can see above, Romanian legislation also asks to document these processes. This can include technical aspects such as the collection of appropriate metadata for data deletion or logs for authorized access.

[34] Available at: https://www.ohchr.org/sites/default/files/Documents/Issues/Privacy/Romania2.pdf

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Moreover, in terms of AI fairness, Romania is in the process of aligning with the above AI standards embedded into the EU legal and policy texts. This means that cultural institutions should count on technical trained personnel to **monitor fairness in AI processing** and respond to associated rights or provide broad information to visitors about how algorithmically proceed content could affect them. This, for instance, concerns assessing how content translated from ancient artistic objects translated into contemporary language could embed discriminatory assumptions which are not justified historically.

3.4 Germany: CH exhibition as a visitor's journey with no sensing boundaries

The last case corresponds to **SMB-PK - Staatliche Museen zu Berlin - Preußischer Kulturbesitz**[35]. The Staatliche Museen zu Berlin constitutes an encyclopedic museum, spread over many **different sites**, that aims to preserve, research, and display art treasures and cultural artefacts dating from all human history, and educate the public about their importance. The Museum collections encompass the fields of European and non-European art, archaeology and ethnology worldwide.

The SMB Museums are partially well positioned to use **ordinary digital media** channels to reach their audiences online, e.g., social media, and offline within the museums. Audio-guides are a standard and usually designed for many exhibitions. Also, panoramic video tours, even in high definition, guide the visitors on their home screens through the collections. The project "museum4punktnull", successfully funded from 2018 to 2023, even promoted a high degree of digital interaction between the collections and the diverse and differently interested audiences. Nevertheless, for many exhibitions, there are still none or **clearly insufficient applications** for **visually impaired, blind and disadvantaged visitor groups**. Therefore, we aim to test the SHIFT Toolbox to provide superior assistance for people with visual impairments while visiting the SMB museum. The SMB-PK collection of CH objects potentially subjected to this technological mediation includes more than 10.000 paintings (90% are digitized), more than 1.000.000 prints/drawings (25% digitized) and more than 200.000 photos (10% are digitized). Moreover, more than 1.000.000 statues and objects (out of which 2000 are digitally modelled in 3D format), among other assets.

In this scenario, a novel exhibition on "*CH exhibition as visitor's journey, with no sensing boundaries*" will be prepared and will encompass the following systems:

- "Text to Speech" tool for people with visual impairments – will use book resources, descriptions of photos/paintings and provide complementary information regarding the cultural heritage assets.

[35] More information at: https://www.smb.museum/en/about-us/profile/

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- "Image to Text to Speech" tool that automatically generates textual descriptions of paintings / depictions / sculptural objects
- Tool that translates physical objects to digital objects and use haptics to "feel" the objects. Haptic interaction with 3D digital tangible and intangible cultural heritage assets, augmenting the Users Experience (UX) with new interaction paradigms that can be used in situ or remotely
- Comprehensive intuitive and accessible tool for all multimodal storytelling of cultural heritage assets.
- "Image to sound" tool for generating soundscapes from landscape-painting
- "Atmosphere" / Generating emotional address from speech

Data subjects' participation and data processing

Groups involved in data processing are:

- **Visitors** will be the leading group involved in testing the above innovative AI and ML solutions for multimodal access. A representative group of museum visitors with visual impairments will be invited to evaluate critical aspects of their experiences engaging with the exhibition. Semi-structured oral interviews and recorded questionnaires will have the experiences collected and evaluated, encompassing specific SHIFT tools.
- The second group involved will be **curators**. They will participate in a recorded, interview-based evaluation of their perceptions and experiences in organising exhibitions and embellishing content.

3.4.1 Addressing the German case from SHIFT normative framework

This subsection briefly describes the primary specifics of AI and data protection regulation in Germany. On this basis, it frames the above technological adoption process considering the potential alignment required before and during technological implementation.

The SHIFT case study in the German data protection framework

The German Data Protection Act (BDSG)[36] , replacing the German Federal Data Protection Act, was officially published in the Federal Gazette on July 5, 2017. It adjusted the German legal framework to the European General Data Protection Regulation (GDPR). Most GDPR requirements in Section 2 (data protection principles, data subject rights and lawful basis for data processing, etc.) have been directly integrated into the BDSG.

[36] Available at: https://www.bgbl.de/xaver/bgbl/start.xav?startbk=Bundesanzeiger_BGBl#__bgbl__%2F%2F*%5B%40attr_id%3D%27bgbl117s2097.pdf%27%5D__1695307116744

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However, some **differential elements and provisions** should be considered. Firstly, the **obligation to appoint a data protection officer** is stricter in the BDSG than those stipulated by Art. 37 GDPR. According to Sec. 38 BDSG, organisations operating in Germany must designate a data protection officer if they regularly employ at least 10 persons dealing with the automated processing of personal data. Also, if they undertake processing that is subject to a data protection impact assessment, according to Art. 35 GDPR, and if they process personal data for transfer or anonymous transfer commercially or for market or opinion research.

Moreover, the GDPR specifies administrative fines of up to 20 million euros or 4% of the global revenue – depending on which amount is higher. Violations which solely concern BDSG requirements law will be limited to a maximum fine of 50.000 euros. Still, this scenario will be infrequent in practice and only covers particular cases, such as information duties referring to consumer loans. In all other cases, the high maximum fines stipulated by the GDPR apply. The new BDSG also defines **non-monetary damages** (Chapter 7, Section 83). These damages, such as proposed compensation for pain and suffering, are not readily quantified or valued in money. Data subjects may claim damages for non-pecuniary damage.

The SHIFT case study in the German AI framework

Although there is no overall AI regulation in Germany, the German Federal Government has **launched various initiatives and guidelines on AI fairness**. This includes the National AI Strategy (2018) produced by the Federal Ministry of Education and Research, the Federal Ministry for Economic Affairs and Energy, and the Federal Ministry of Labour and Social Affairs. The document states that "*The Federal Government is committed to ensuring that data is used in line with the provisions in the constitution such as non-discrimination and the right to privacy protection*" (The Federal Government, 2018: 38). The document was modified in 2020, in an Updated AI strategy.

The Federal Governments Data Ethics Commission (2019) also reflected core principles for AI design and implementation in its ethical guidelines and Opinions, based on the **principles of human dignity**, self-determination," which *express the idea of a human being a self-determined player in a data society*"(The Federal Government, 2019:49), privacy, security, democracy, justice and solidarity and sustainability. At the international level, Germany is an active member of the AI Act discussion at the EU level and contributes to the work conducted by the OECD in this regard.

It should be noted that the above importance of **non-discrimination in AI policies** is critical for the German context, and it is aligned with a national tradition in this domain. For instance, the Anti-Discrimination Act in Germany will regularly govern robo-recruiting and other AI applications in the field of employment. The established legal opinion in the legal literature in Germany suggests that any such

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AI applications need to be trained with data mirroring the applicable "*reality of society*". The provisions of the General Equal Treatment Act (AGG) must also be considered. The law prohibits discrimination in numerous areas of private legal transactions based on race or ethnic origin, gender, religion or belief, disability, age or sexual identity (§ 1 AGG).

3.4.2 National implications of SHIFT technological adoption

Including persons with hearing impairments through the SMB-PK exhibition "*CH exhibition as visitor's journey, with no sensing boundaries*" entails several of the institution's challenges to engage the public further while ensuring accessibility. The use of text-to-speech tools and translation of physical objects into haptics and atmospheres to approach the content to specific users not only requires addressing technical complexity but a focus on those protocols aimed at not building new access barriers or breaching the privacy rights of individuals.

Following the BDSG, museums in this context must ensure data security, establish mechanisms for information auditing, and update privacy statements properly explaining **legal grounds for the processing or record keeping**. Moreover, training should be provided to the museum staff to support "privacy by design" so they know how to protect people's personal information in the new data processing scenario. All of this should be contextualized in the BDSG requirement of appointing a **DPO for the museum** since most of them will have more than ten individuals involved in regular activity. Furthermore, Germany is aligned with the above AI risk-based approach. When setting the ethical implications of an AI algorithm, authorities have focused on whether algorithms may impose potential damage and ask organizations to evaluate this beforehand and on a case-by-case basis. Particular attention should also be paid to the types of data collected, focusing on those datasets corresponding to **protected groups and attributes** (i.e. disabled, gender, elderly, migration groups). In this regard, it should be noted that museums and cultural institutions are generally liable for the content generated by their AI systems, such as AI-generated art or AI-generated descriptions of artefacts. Therefore, museums must ensure that the content generated by their AI systems does not violate any laws (non-discrimination) or ethical standards.

As we can see in the following Table 5, the above contrast cases reveal similarities in the **European convergence** towards similar data governance, security and data protection designs together with increasing demand for tools for ensuring algorithmic fairness from preventative and auditing approaches.

Table 5. Summary of case studies context and requirements

Member State	Case study specifics in terms of personal data and AI	Observations on differential requirements to be considered in SHIFT

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Serbia	• Local authorities' notifications and authorizations for sharing personal data (for instance, sensitive data used for haptic experiences) should be demanded when required. • Moreover, AI fairness and non-discrimination requirements need to be addressed using the self-assessment tool included in the national AI Guidelines. Risks levels of each tool should be assessed before technological adoption.	• Possible biases in the AI based translation of historical paintings should be considered. Curators and visitors, in particular those visually impaired, should be part of the bias assessment to ensure proper contextualization.
Hungary	• Following national data protection regulations, data governance and sensitivity (for instance, concerning the potential collection of personal data used by interactive tools) should be assessed to ensure compliance with local notification of the processing. • Moreover, industrial standards used for SHIFT tools should be contrasted against national requirements prescribed by the Hungarian AI strategy 2020-2030.	• Like the above, an ongoing audit of potential bias in translating ancient medical practices obtained from objects should be carried out.
Romania	• Technical and organizational measures for safe data protection should include systematic documentation of personal data handling. • Human resources and technical means should also allow ongoing algorithmic maintenance and audit. This includes providing information on algorithmic processing to visitors.	• AI fairness in translating historical meaning and targeted messages should be examined. Staff and curators should be engaged in this process.
Germany	• The museum should provide data governance requested by the BDSG, including a DPO and personnel trained to address data subject rights. This also applies to AI, which should be particularly monitored concerning the need for non-discrimination.	• Visitors' autonomy when taking part in immersive experiences should be particularly assessed. Protected groups should not encounter unexpected technological barriers in this process.

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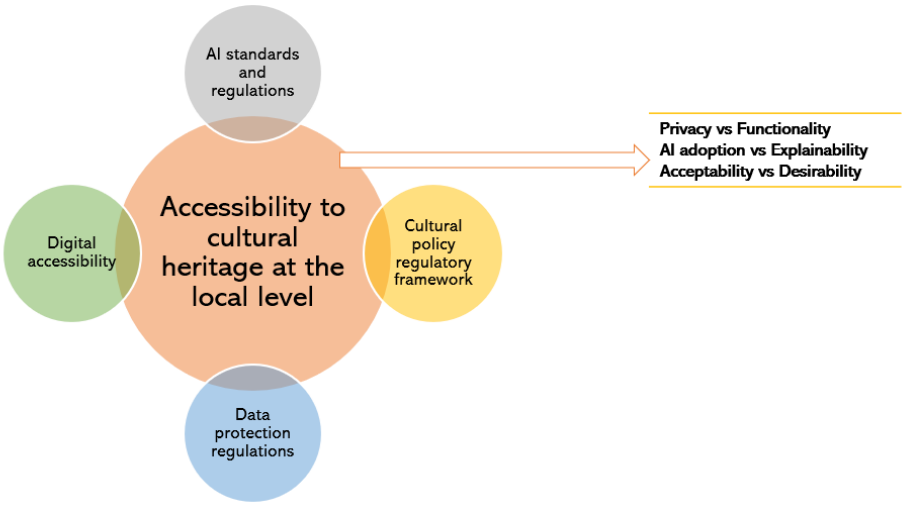
4. Analysing and operationalizing the SHIFT legal and ethics framework

This section examines the above legal requirements and ethical principles from the perspective of the main **cross-cutting conceptualization axes to consider** by cultural organizations implementing SHIFT technologies. As shown in Figure 1, we discuss digital accessibility to cultural heritage in its complex and several intersections with privacy, AI fairness and digital access. The analysis of normative tensions is conducted from an approach that considers the relationships between technological-based accessibility policies and new exclusionary effects that might emerge from SHIFT adoption. Therefore, an essential part of the policies to be adopted by cultural organizations using SHIFT tools will involve the **organizational and technical resolution of such tensions**. This exercise should be part of cultural organizations when assessing ethical considerations involved in managing, storing and using data using the SHIFT toolkit.

Figure 1. Intersected normative frameworks around SHIFT



4.1 Privacy, consent and proportionality: problematization and recommendations

AI applications in cultural heritage institutions often collect and process large amounts of data, including images, videos, and text. Museums process visitor data through digital technologies, such as visitor tracking systems, mobile apps, and

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interactive exhibits. This data can include information like visitors' location, preferences, and interaction history. While this data can enhance visitor experiences and help museums make informed decisions, as the EC and EP pointed out in the above documents, it **raises privacy concerns** about collecting, using, and storing personal information. Institutions must ensure that they have a legitimate basis for data collection and comply with relevant data protection laws, including the GDPR.

Following the above data protection framework, all institutions adopting SHIFT technologies should establish a robust data governance framework, with technical staff and a Data Protection Officer, to implement their Data Management policy. Such framework should have a focus on the intersections between privacy and outcomes from data processing automation aimed at ensuring accessibility. With this aim in mind, organizations implementing SHIFT tools should establish **clear accountability** (Art. 5, GDPR) and **governance structures** for AI systems to ensure compliance with data protection regulations is maintained throughout their lifecycle.

On this basis, visitors should be **properly informed** of all grounds and goals for processing their data clearly and individually (Art. 7, GDPR). Cultural institutions should obtain informed consent from individuals when collecting personal data through SHIFT technologies in most scenarios. Consent from visitors should be gathered before collecting data, clearly explaining the purpose of data collection and providing options for opting out or adjusting privacy settings. Moreover, consent must be regained in those cases where data will be used for purposes beyond what was originally intended. Commitments should be communicated concerning protecting the information managed by cultural organizations, particularly the personal data they handle, as mandated by Convention 108+. This includes both the data provided by visitors or the Museum or space's collaborators. SHIFT Privacy Policies should also reflect the basis on which the institution processes personal data by any means, either digital or analogue. Additionally, **maintaining transparency in AI decision-making** processes is essential. Visitors and users should understand how AI is used, what data is processed, and the impact on their experiences, as recommended in the Ethics Guidelines for Trustworthy AI (2019).

The assessment of **necessity and proportionality** in processing personal data, particularly concerning special categories of personal data such as biometrics, should consider those technical and human mechanisms aimed at ensuring data protection (Art. 35, GDPR). This includes the way cultural institutions implement **security measures** to protect data from breaches, unauthorized access, and cyberattacks. Safeguarding visitor data is crucial to prevent breaches and unauthorized access. Ensuring strong data security measures is essential to protect the privacy of museum visitors. Cultural organizations can mitigate privacy risks by **anonymizing and aggregating data**, namely stripping data of

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personally identifiable information and reporting it in a way that prevents individual identification.

Institutions should establish clear policies regarding the **retention and deletion** of data (Art. 5, GDPR). Personal data should not be kept for longer than necessary for the intended purposes. Along these lines, organizations should adopt a "data minimization" approach when using SHIFT tools, only collecting and processing the data required to achieve specific, legitimate purposes. Lastly, concerning cross-border Data Transfers, institutions must ensure compliance with data transfer regulations, such as GDPR's provisions on international data transfers (Art. 44, GDPR), if data is shared or processed across borders. Particular attention should be paid to data exchanges with third countries and alignment with GDPR standards.

Privacy rights and proportionality of implementing SHIFT technology

Even though the above general recommendations are implemented, digital technologies in museums and cultural heritage spaces present a complex **interplay between privacy and accessibility considerations**, as suggested in the EC report (2022) *Opportunities and challenges of artificial intelligence technologies for the cultural and creative sectors*. Digital technologies can significantly enhance the accessibility of museums for individuals with disabilities. As in the SHIFT approach, audio guides with text-to-speech functionality, tactile exhibits, and sign language interpretation through videos can make productions more accessible to diverse audiences. These digital tools are expected to allow museums to offer customized experiences based on visitor preferences, such as language, accessibility needs, and interests, which can improve acceptability by tailoring content to individual requirements.

However, there are several **trade-offs between data collection and privacy**. Balancing the benefits of customization and accessibility with visitor privacy requires careful consideration and robust data protection measures. Furthermore, seeking explicit consent for data collection and processing can sometimes create **friction in the user experience,** particularly for individuals with disabilities who rely on digital tools for accessibility. Striking a balance between accessibility and privacy consent processes requires specific attention to information provision.

Moreover, in terms of algorithmic training, **maintaining visitor data** for extended periods to improve future experiences can raise privacy concerns, entailing a complex balance between AI accuracy and compliance with the principle of **storage limitation**. Institutions must determine appropriate data retention policies considering accessibility needs and privacy principles. Additionally, collaborations between museums, researchers, and technology providers may involve sharing visitor data. Reaching a balance between data sharing for research and maintaining visitor privacy can be challenging. Lastly, as pointed out in the EP report *Artificial intelligence in the context of cultural heritage and museums*,

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implementing accessible digital technologies **can be costly**, and museums may need to allocate resources to ensure compliance with accessibility standards. These costs may affect budgets and resource allocation for privacy protection measures.

In brief, museums using digital technologies must balance enhancing accessibility and protecting visitor privacy. Achieving this balance requires clear policies, robust informed consent/assent practices, strong security measures, and ongoing efforts to minimize risks and ensure that technology serves the dual goals of making cultural heritage more accessible and respecting individual privacy rights.

4.2 Bias, AI fairness, transparency, explainability: problematization and recommendations

Using AI in European cultural heritage institutions can offer significant benefits, as outlined in the above summarized *European Parliament resolution on AI in education, culture and the audio-visual sector (2021)*. Firstly, we have identified aspects such as enhanced **preservation and restoration**, including AI assistance in preserving and restoring cultural artifacts by analyzing images, videos, and sensor data to detect damage and recommend restoration techniques. Secondly, content digitization, covering AI-powered technologies, such as OCR (Optical Character Recognition) and object recognition, can help digitize and catalogue vast collections of documents, images, and objects, making them more accessible (Christ et al., 2017). Thirdly, AI-driven recommendation systems can enhance visitors' experiences by providing personalized content and tour suggestions based on their interests and preferences. Lastly, as a transversal aspect and a core element in SHIFT, improved accessibility can be achieved by making cultural content more accessible to people with disabilities through technologies like image recognition and text-to-speech conversion.

However, AI algorithms can **inherit biases from the data** they are trained on, entailing potentially an "historical bias", which reproduces biases in cultural heritage materials (Pablo et al., 2023). If the training data is skewed towards one culture or demographic group, AI may not recognize the significance of artifacts from underrepresented communities in translation, further exacerbating cultural biases. Moreover, if the algorithms are not carefully designed and monitored, they can lead to the promotion of certain artifacts or exhibitions while neglecting others. Following the above EU human-centred framework for AI, SHIFT must actively work to mitigate bias and ensure fairness in AI systems, following the principle of **human oversight** integrated into the AI European framework.

Furthermore, ensuring that AI-driven accessibility features are designed to be genuinely inclusive is crucial. If these features are not well implemented or if AI algorithms inadvertently exclude certain groups of people with disabilities, it can lead to the emergence of **new accessibility disparities**. Interpretation and

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context can also be biased towards certain groups. The quality and accuracy of AI-generated interpretations can vary, and there's a risk of **misrepresentation or oversimplification**. Museums must carefully **curate and verify AI-generated content** to ensure accuracy and avoid perpetuating stereotypes or biases. This requires the establishment of specific technical governance at the institutional level aimed at following the principles of technical robustness reflected in the *Ethics Guidelines for Trustworthy AI* (2019)

As part of the above issues to be addressed by both developers and implementers (cultural organizations), certain **trade-offs between SHIFT adoption and explainability** should be particularly considered. Firstly, the "**black box"** nature of AI. Many AI algorithms are often defined as "black boxes" because humans do not easily interpret their decision-making processes (Shin et al., 2022). This lack of transparency can be a significant trade-off to be tackled by cultural organizations and addressed by SHIFT by design. Secondly, there are potential difficulties in **art interpretation**. AI systems used for art interpretation may provide results that are challenging to explain. Visitors may wonder how AI arrived at its conclusions about an artwork's meaning or historical meaning, and cultural organizations should be ready to provide further clarification. Thirdly, the above privacy concerns should be considered as part of AI processing operations. For instance, AI-driven visitor analytics systems can **track visitor behaviour**, raising privacy concerns. The explainability of these systems is crucial to gaining visitor trust and addressing potential concerns about data collection.

As suggested above, some key policies should be considered for mitigating the above risks. Firstly, **explainability policies** in the design of algorithms, including tracks of model cards, are to be developed in SHIFT so AI algorithms and models are more transparent and interpretable when possible. Techniques like rule-based systems, decision trees, and model-agnostic explanations can help. Secondly, there is a range of measures to be applied by cultural institutions as detailed in the above regulations and guidelines, including **interpretation assistance**. Cultural organizations must provide interpretive materials that explain how AI systems work and the limitations of their decision-making processes. This can help **elucidate AI for visitors**. Trained personnel should be an additional requirement as part of this. Moreover, **ethical AI practices and guidelines** should be produced by each organization adopting SHIT to ensure that AI systems are as fair and accountable as possible. This can enhance the trustworthiness and acceptability of AI applications. In terms of users, the main additional aspects concern user **education and control**. Organizations should educate visitors about AI technologies, their role in enhancing the museum experience, and the privacy protections in place. They should also allow visitors to customize their AI-driven experiences to some extent, such as adjusting the level of personalization in content recommendations.

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4.3 Adaptability and desirability of the SHIFT tools

Taking the above elements into account leads to a rethink of the positive and negative implications of adopting SHIFT tools from the perspective of **available alternatives and overall desirability** (Ghodke and Ranade, 2023). This consideration supports a safe technological adoption by providing a set of vital potential threats derived from this process and associated mitigation mechanisms.

Overall, AI can create interactive and **personalized experiences** for museum visitors, making cultural institutions more engaging and appealing to a broader audience. AI-powered captioning, translation, and accessibility features can make museums more inclusive for people with disabilities and non-dominant languages, such as English) speaking visitors. Moreover, this can support internal institutional processes, such as the curatorial task, by **helping curators** identify trends in visitor preferences and optimize exhibition layouts or recommend acquisitions based on data-driven insights. Moreover, preservation and restoration can be facilitated by identifying damage, suggesting conservation techniques, and anticipating potential deterioration. AI-driven inventory and cataloguing systems can facilitate the management of vast collections, making them more accessible for researchers and curators.

However, as seen in the above documentary analysis, collecting visitor data for personalization raises **privacy and AI fairness concerns**. Institutions must be transparent about data usage and ensure robust data protection measures. Moreover, overreliance on AI may diminish the importance of human curators and educators, potentially reducing the human touch many visitors value. Additionally, AI algorithms may inadvertently perpetuate bias or cultural insensitivity in content recommendations or interpretations, requiring careful oversight and curation. Along these lines, not all visitors may have access to the technology necessary to engage with AI-enhanced exhibits, potentially excluding specific demographics fully.

Issues to consider also affect the **constitutive dimension of exhibitions**. AI-generated content may raise concerns about the authenticity of historical artifacts or artworks, necessitating strict verification and documentation. The above process also poses technical challenges since AI systems can be complex and may require regular updates and maintenance, which can strain resources and technical expertise. Monitoring AI technologies can be expensive, and smaller museums or cultural institutions with limited budgets may need help to manage these innovations.

In a few words, each institution implementing specific tools within SHIFT should assess challenges related to **cost, privacy, and potential loss of human interaction and adapt tools to its specific demands, resources and capabilities**. To ensure the desirability of AI implementation, institutions should carefully weigh these factors, prioritize inclusivity, and establish transparent policies for data usage and content curation. Ultimately, a balanced approach that

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combines the strengths of AI with the expertise of human curators and educators is likely to yield the most desirable outcomes.

5. Conclusions

Within the scope of Task 1.5, we have established the ethical and social requirements of the SHIFT toolkit. This elaboration has been based on the review of applicable regulations and normative documents in four intersected domains: digital accessibility, AI, data protection and cultural heritage. With visitors' accessibility as the central axis of the analysis, we have established the main by-design and default requirements to be considered in developing SHIFT technologies.

This legal framework has been contrasted through an illustrative presentation of four adoption cases belonging to the project validation in Romania, Germany, Hungary and Serbia. This contrasting analysis provides some elements concerning the local specifics to be considered in the SHIFT tools' implementation. At the same time, it demonstrates a high level of alignment in the generation of national standards on privacy protection and AI fairness, which facilitates industrial development. Still, most examined documents call for proper social contextualization of systems together with ongoing audit and authorities monitoring. Moreover, following the AI Act approach, each SHIFT technology implementation process entails the need for a risk level definition at both automation and data protection levels, together with several contextual technical and organizational processes, before adoption. This includes concrete tools for ensuring compliance and explainability adapted to users and end users.

Lastly, we have examined how inevitable key trade-offs and legal tensions between privacy and accessibility or AI-based accessibility and exaplainability could be interpreted and addressed in the process of technological adoption. This framework is not only aimed at compliance and can be seen as a starting point in mitigating any negative social impact derived from the design of the project outputs and facilitating a constant dialogue between legal and ethical requirements to be followed and avenues for their integration into both policies and technologies.

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