A Framework to Support Digital Humanities and Cultural Heritage Studies Research

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Abstract

Developments in information and communication technologies and their repercussions for how cultural heritage is preserved, used and produced are the subject of several research and innovation efforts in Europe. Advanced digital technologies create new opportunities for cultural heritage to drive innovation. Digital humanities are an important domain for cultural heritage research in Europe and beyond. Digital tools and methods can be used in innovative ways in cultural heritage research. The research and innovation efforts and framework of digital humanities, and cultural heritage as one of its research fields, are influenced by EU policies and legislation. This article describes the existing policy initiatives, practices and related legal setting as framework conditions for digital humanities and cultural heritage research and innovation in Europe – focusing on urban history applications in the age of digital libraries. This is a multifaceted study of the state of the art in policies, legislation and standards – using a survey with 1000 participants, literature surveys on copyrights and policies.

Keywords: digitisation, cultural heritage, European policy, legal framework, research and innovation

1 Introduction

In this article, we present the framework demands and analyse the current state of the art of legal and policy issues related to research and innovation on digitisation and cultural heritage. This is done in three main parts. First of all, we present the results of an online community survey of needs for a supportive policy and legal framework concerning digitisation and cultural heritage. Secondly, we analyse the most recent EU policy and funding schemes, to present the context and trends which impact on research

and innovation processes in relation to cultural heritage and digitisation. Third, we analyse the current legal framework to reach a broader understanding of the conditions which affect and structure these research and innovation processes in digital cultural heritage (DCH).

2 Survey

To analyse current demands from a community point of view we conducted an online survey. The specific interests related to investigations are:

- What is the digital heritage community and where are its members from?
- What are demands do they make concerning framework conditions?

2.1 Theoretical Framework

From a theoretical perspective several approaches focus on historical, philosophical and sociological aspects [1/ 65,2]. A prominent concept provided by science and technology studies characterises fields of research by specific epistemic cultures in terms of "architectures of empirical approaches, specific constructions of the referent, particular ontologies of instruments, and different social machines" [3, p. 3], techniques to gain insights, different vocabularies, different publication bodies and habits [4]. According to this approach, scholarly fields "(a) have a particular object of research […], (b) have a body of accumulated specialist knowledge […], (c) have theories and concepts […], (d) use specific terminologies […], (e) have developed specific research methods […], and (f) must have some institutional manifestation in the form of subjects taught at universities or colleges" [2].

Quantitative studies

Various surveys have been conducted to investigate digital use and practices in the humanities. The DARIAH DIMPO survey published in 2016 had 2100 participants and focused on regional coverage and the use of digital methods [5]. Its main finding was that the digital humanities community in Europe is widely driven by German and French researchers. Similarly, the e-Science survey series with 860 participants covered the private and professional use of digital tools: its main finding was that the private use of digital tools does not differ much between researchers from the humanities and other disciplines. In contrast professional use is highly divergent between single humanities disciplines but digital tools are less used than in other disciplines [6]. In the context of digital heritage studies various surveys were carried out on specific topics. The ViMM survey with 700 participants queried digital challenges and protagonists [7]. The surveys by INCEPTION, the VIGIE study and the Europeana 3D task group focused on the use of 3D [8].

Scholarly communities in digital humanities have been examined with regards to conference contributions and related patterns in various investigations.[1] Most relevant for the community of digital humanities is the research of Scott Weingart on the ADHO DH conferences [9]. For a fundamental analysis of topics in the humanities, see Leydesdorff et al. [10]. For digital heritage studies, Spugnoli investigated topics of an Italian conference series [11]. Muenster et al. analysed 4500 international publications stemming from six major conferences in digital heritage studies and dating from 1973 to 2015 [12,13] as well as three panel surveys since 2017 [14,15].

2.2 Methodology

The methodology of the survey was as follows:

- **Open-ended questions:** The survey used open questions only, to allow for diverse answers and to retrieve additional items [16].
- **Sampling:** During May and June 2019, the survey was sent to ~5000 individuals who were authors of papers in the main conferences in DCH as the ICOMOS CIPA Symposium, DIGITAL HERITAGE, EUROMED, CAA the CIPA 3DArch workshop [cf. 12] and members of international associations as the International Centre of Archival Research (ICARUS), the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) and the Time Machine Organisation (TMO).
- **Survey participants:** In total 968 individuals responded; of these, 406 completed the survey. Since the questions did not depend on each other, we included only partly filled forms in the evaluation.
- **Data analysis:** Data was clustered via alternating inductive and deductive steps of qualitative content analysis [17].
- **Ethics:** All responses were anonymous. The acquired metadata contained information about location only. This data was used to investigate the geographical coverage of the survey.

2.3 Findings

The survey included six questions. The following findings are taken from responses to one question: The Time Machine will have impact on standardisation, policies and law in Europe and its nations. What actions on these topics would you suggest to include in a roadmap? We received 590 answers to this question.

[1] An overview can be found at: http://scottbot.net/dh-quantified/

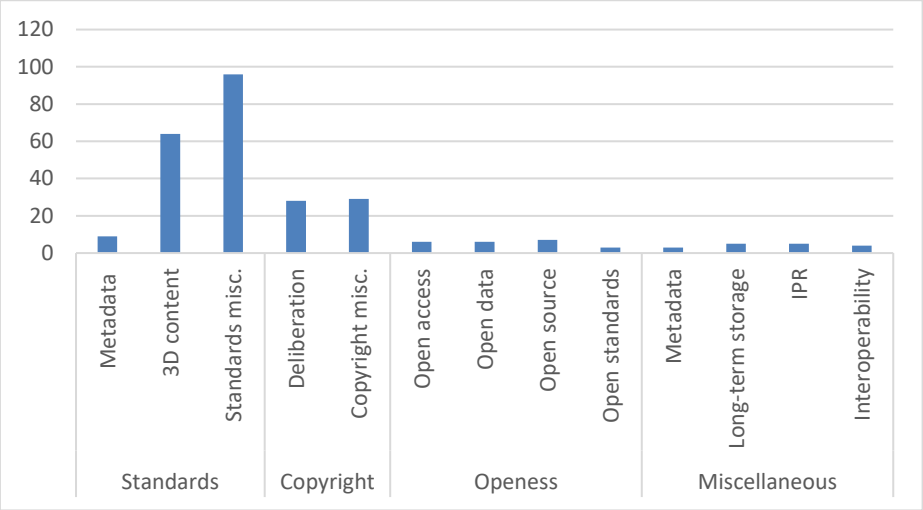

Figure 1. Question: The Time Machine will have impact on standardisation, policies and law in Europe and its nations. What actions on these topics would you suggest to include in a roadmap? **Coding: 265 with min. occurrence 3 nominations per group answers selected out of total 590**

Overall, standards are the most frequently mentioned topic on which respondents see the need to take action. Most answers did not further specify which type of standards they meant, so these have been categorised as miscellaneous (misc.). The most frequently mentioned standards, on which 60+ respondents demanded action, was 3D content. 10 respondents asked for metadata standards. Occasionally standards for other media, such as "musical records" were also requested.

Concerning copyright, around 30 of the answers mentioned copyright without further explanations and the deliberation of copyright. Less frequently, openness in terms of source, data, access and standards are mentioned by less than ten participants each. Occasionally, other aspects not fitting in these categories were mentioned (e.g. intellectual property rights).

2.4 Discussion

From the survey there evolved a very clear view that standards, and specifically 3D standards, are of highest relevance for taking action. This finding is in line with various European-scale endeavours – e.g. the Europeana 3D task group [8], European Commission tender on 3D digitisation and the DT-20 Competence Center CSA.[2] In addition, various EU projects developed standards and workflows for 3D digitisation, including 3D-COFORM, 3D-ICONS, CARARE, PARTHENOS and Share3D [cf. 18]. Even after

[2] https://ec.europa.eu/digital-single-market/en/news/study-quality-3d-digitisation-tangible-cultural-heritage

30 years of 3D related activities and various standard setting initiatives there is no established consensus about 3D data standards beyond file metadata.

Surprisingly, openness is only occasionally named as challenge. This may be for the technical reason that open access was not explicitly named in the question text. Since even deliberated copyright was demanded by 30 participants only, it seems questionable whether openness as a main challenge in current EU research policies[3] is that relevant for DCH to date. The concrete demands concerning copyright (e.g. homogenisation of copyright, open access and simplified rules) are also unclear.

3 State of the Art in Policy and Funding Practices

Cultural heritage has gradually gained ground as a subject for research and innovation policy in Europe. It is a multidisciplinary domain in relation to the ICT sector, digitisation and innovation for economic and social impact. The EU dedicates resources and efforts to cultural heritage via research and innovation framework programmes, policy initiatives, expert groups and tailored events coupled with digitisation.

Below, we analyse the most recent EU policy and funding schemes relevant to cultural heritage and digitisation. The focus is on current research and innovation policy and funding programmes, including the impact of the COVID-19 crisis on policy and funding practices on digitisation of cultural heritage.

3.1 Theoretical Framework

Scholars have addressed various aspects of the European policy framework supporting digitisation of cultural heritage. The relevant literature focuses on three major and interwoven areas.

One strand of research discusses European cultural heritage policy framework and funding context entailing aspects and focus of innovation and digitisation [19-22]. Other scholars focus more on digitisation, cultural heritage and European policy framework [23,24]. Another set of scholars focus on digitisation, digital innovation and implications for European cultural assets for economic and societal benefits, challenges for cultural heritage institutions illustrated through EU projects, stakeholder networks and cases [25-29]. Scholarly articles present major European policies, strategies and initiatives in relation to digitisation of cultural heritage such as the Lisbon Strategy (2000) [30], Lund Principles and Action Plan (2001) [31,32], i2010 Digital Libraries Initiative (2005) [33], Digital Agenda for Europe (2010) [34], European Year of Cultural Heritage (2018)[35], European Heritage Strategy for 21st Century [36], European Framework for Action on Cultural Heritage [37], New Strategic Agenda for the EU (2019–2024)[38], Work Plan for Culture 2019–2022 [39] and other EU legislation on digitisation of cultural heritage [eg. 20,23,22,24,28].

The scholarly articles provide extensive overviews and elaborations with regards to content, aim, role of European-scale policies, legislations and initiatives for cultural

[3] See e.g. https://ec.europa.eu/research/openscience/index.cfm?pg=openaccess

heritage from the perspective of digitisation and innovation. The European Commission's "Mapping of Cultural Heritage actions in European Union policies, programmes and activities, August 2017" [40] presents recent EU policies and actions with regards to cultural heritage.

In this article, we focus European research and innovation in cultural heritage and digitisation through the most recent policy documents and funding priorities. We take the 'systems of innovation' approach to shed light on the complex nature of generation and diffusion of innovations in this area. Edquist (1997) mentions the variety of factors and relations between institutions and organisations influencing innovation processes to explain systems of innovation [41]. A complex setting is defined for innovations processes which occur through time and are affected by various factors. In this respect, the interactive nature of innovation is emphasised where firms innovate in interaction with other organisations – "other firms (suppliers, customers, competitors) but also universities, research institutes, investment banks, schools, government ministries, etc." – in processes influenced by a set of "institutions that constitute constraints and/ or incentives for innovation, such as laws, health regulations, cultural norms, social rules, and technical standards" [42 pp. 1-2].Taking the system approach, the institutional framework for digitisation and cultural heritage is interrogated in terms of research and innovation policy and legal framework.

Methodology

The study is primarily based on analysis of most recent policy documents with specific emphasis or correlation to digitisation and cultural heritage in Europe.

Data retrieval: For our study, data sources were analysed to derive out policy content, objectives and approaches. The focus is on three sets of data:

1. Scholarly articles on cultural heritage, digitisation and innovation.
2. EU policy documents on cultural heritage, digitisation, research and innovation.
3. Information on EU research and innovation funding schemes relevant to cultural heritage.

Relevant articles were identified via a keyword search in Google Scholar database as well as in the Publications Office of the EU database. Out of a total of 24260 retrieved articles and publications we selected 70 for further analysis based on criteria that they entail European level research, innovation and digitisation policy content on cultural heritage.

Evaluation and analysis: We applied two-stage inductive and deductive qualitative content analysis as per Mayring [17] for systematic analysis of text to retrieve manifest content and to understand the policy concepts with regards to digitisation and cultural heritage.

Theoretical framework: The EU level reports, strategies, communications and other official documents were confined to those having contemporary effect.

In this sense, a "design science" framework is applied. The method used is based on the work of Romme and Meijer (2020) offering a contribution to discourse by combining "retrospective research" based on "scientific validation" and "prospective research" as "creative design" [43]. Beyond traditional approaches based on linear and top-down oriented processes, their work is about developing a design approach for public policy

and administration (PPA) that integrates validation and intervention-oriented design. It affirms the role of user engagement, creativity in prospective design and validation of retrospective research. Where design is about generating and elaborating new practices of PPA, validation is about theorising the practices created. This integrated approach enables theoretical understanding of policy, practices and interventions to improve them [43]. The community survey presented in Section 2 is used to shed light on policy and practices (Section 3) and legal framework analysis (Section 4). Based on theorisation of community needs, the authors take a design science approach to the policy and legal framework for digitisation of cultural heritage and intervention for new practices.

3.2 European Policy and Practices on Cultural Heritage and Digitisation

The most recent policies and initiatives with an impact on post-2020 research and innovation agenda in Europe are examined below in terms of their key function and call for action to enhance the digitisation and innovation of cultural heritage. This exercise feeds into the analysis of the current policy and legal framework in this field. This framework provides a basis for bottom-up initiatives aiming to reinforce DCH research and innovation landscape in Europe.

3.2.1 The European Heritage Strategy for the 21st Century

The Recommendation of the Committee of Ministers to Member States on the European Cultural Heritage Strategy for the 21st century (Strategy 21) was adopted by the Committee of Ministers on 22 February 2017 [36]. Strategy 21 builds on past initiatives and achievements structuring heritage policies and the resulting cooperation across Europe over the preceding 40 years. It aims to enable a common approach to cultural heritage and its effective and integrated management by main actors at national, European and international levels. It aims to build synergy among extant policies and tools, especially among European and international legal instruments. Another objective of Strategy 21 is to increase visibility of European countries' practices and achievements through an information network called the HEREIN system [36].

Strategy 21 rests on three priority components: social; territorial and economic development; knowledge and education. Under each component, recommendations are to member states are made in line with their resources, priorities and instruments to meet the challenges identified. Each component give reference to digital tools, techniques and innovative approaches for cultural heritage. In the strategy, cultural heritage is presented as a strong component of social and economic development and correlated with other sectors. It is also perceived as a vital asset for "education, employment, tourism and sustainable development" [36 p. 4].

Under the social component to boost citizen involvement in capturing the value of their heritage, member states are called to make visible and employ digital tools to promote citizen involvement. Utilisation of digital instruments, the latest technologies and interdisciplinarity are emphasised for enhanced access to heritage. Digital forms and

reuse of heritage are associated with asserting European values and promoting dialogue among different cultures and generations.

The territorial and economic development component includes enhanced use of new technologies such as augmented reality, digitisation and 3D scanners to protect, restore and promote heritage. In the component on knowledge and education, the aim is to make information on digital heritage more accessible, open and practical to support the integration of heritage-related content in school education.

From a macro-perspective, Strategy 21 aims to enhance the concerted efforts across member states to exploit the benefits of digital tools and technologies for cultural heritage. The recommendations stress the value of a supportive framework to effectively implement digitisation, standardisation and open access.

3.2.2 The European Year of Cultural Heritage 2018

Launched by the European Commission, the European Year of Cultural Heritage (EYCH) 2018 aimed to boost people's engagement with Europe's past and a common sense of belonging to Europe. It aimed at giving citizens a better grasp of Europe's cultural heritage for a better future of Europe and entailed a series of events and initiatives across Europe. The Year awarded its label to over 13000 events organised in Europe. A further 620 initiatives of third countries were associated with the Year [35,44].

The Commission and key stakeholders launched ten European Initiatives[4] for the EYCH in connection to its four key principles: "Engagement, Sustainability, Protection and Innovation" [51]. The aim was to make a long-lasting impact beyond 2018. The initiatives were intended to enable joint action and reach various target groups across Europe. The innovation principle entailed three initiatives: "Heritage-related skills: better education and training for traditional and new professions"; "All for heritage: fostering social innovation and people's and communities' participation"; "Science for heritage: research, innovation, science and technology for the benefit of heritage" [45].

EYCH 2018 is an example of a comprehensive and far-reaching project for creating and sustaining the value and role of cultural heritage widely across research and innovation communities and citizens of Europe. The initiatives and objectives of the Year are complementary especially for boosting community engagement and acceptance for heritage-related research and innovation actions across Europe.

3.2.3 A New European Agenda for Culture

The New Agenda for Culture was adopted by the European Commission in 2018 in response to European Council' scall to enhance the efforts and momentum caught by the 2007 Communication of the Commission "European Agenda for Culture in a Globalised World", the European Parliament's support for this Agenda through specific policy and project initiations, member states' dedicated actions driven by EU level policy

[4] These are: Shared heritage, Heritage at school, Youth for heritage, Heritage in transition, Tourism and heritage, Cherishing heritage, Heritage at risk, Heritage-related skills, All for heritage, Science for heritage.

cooperation through Council Work Plans for Culture, EU funded projects and territorial strategies. The underlying rationale of this agenda is European Council's call "to examine further possible measures addressing, among others, the legal and financial framework conditions for the development of cultural and creative industries and the mobility of professionals of the cultural sector" based on the European Council Conclusions of 2017 [46,47].

The New Agenda is based on three strategic objectives revolving around social, economic and external relations. The role of culture for innovation as a factor in economic growth and employment is mentioned within the economic objective, aiming at "supporting culture-based creativity in education and innovation, and for jobs and growth" [46 p. 3]. Culture and creativity are seen as important resources for the economy.

Enabling favourable environments, facilitating access to finance and enhancing innovation capacity, promoting digital and entrepreneurial skills, and fair remuneration are among the actions described for cultural and creative industries, authors and creators. The potential of cultural and creative sectors to catalyse innovative solutions when combined with other sectors in information and communication technologies, manufacturing, tourism and other sectors is mentioned as "transformative power" [46]. In support of this, the Commission aims to generate favourable conditions for culture-driven innovation [46].

The New Agenda is a critical intervention aiming to enable a favourable system framework for cultural heritage-driven creativity, innovations and the resulting benefits for the economy and society. It emphasises enablers of the innovation systems such as legal and financial frameworks, entrepreneurial skills and innovation capacity in support of the cultural sector.

3.2.4 The Work Plan for Culture 2019–2022

Adopted in November 2018 by the Council of the European Union, the Work Plan 2019–2022 rests on five priorities: sustainability in cultural heritage; cohesion and well-being; an ecosystem supporting artists, cultural and creative professionals and European content; gender equality; international cultural relations. Digitalisation and cultural statistics are considered as crucial horizontal issues in the plan. Its authors state that digitalisation generates "new and innovative possibilities for art and culture in terms of access, expression, preservation, dissemination and consumption" [39].

The importance of digital technologies is underlined for "audience development and innovative methods of participation" in support of the cohesion and well-being priority. Relations with other sectors such as education, science and technology, territorial development and culture-driven social innovations are seen as contributing to the same priority [39].

Under the priority of an ecosystem supporting artists, cultural and creative professionals and European content, the role of creative and cultural resources is emphasised for Europe's competitive power and boosting innovation. Skills development, mobility, cross-border relations and access to financial resources are among the issues depicted for this priority in relation to European-scale exchange and research[39]. One of the action topics of the Work Plan is to identify alternative funding sources for cultural

heritage to ensure its economic sustainability. Innovative instruments and guidelines are mentioned as a subject of an expert group led by the Commission to respond to the need for organisations to understand their digital audiences and adapt to digital developments in flux. Access to financing and support for the innovation potential and creativity of young people are seen as subject to future expert work and recommendations at European level [39].

In a similar vein to the New Agenda for Culture, this Work Plan emphasises the system interventions that target innovations and creativity in the culture sector. Development of skills, a favourable ecosystem, enhanced mobility, facilitated access to finance and organisational adaptation to digital developments are emphasised as a supportive framework for innovations.

3.2.5 The Recovery Plan for Europe

The Recovery Plan for Europe was proposed on 27 May 2020 as a comprehensive European response to "repair damage from the crisis and prepare a better future for the next generation". As a collective action the recovery process is to enable "green and digital transitions" for enhancing the competitiveness, resilience and global role of Europe. The recovery process is based on an egalitarian approach and targets cohesion and convergence of across Europe [48].

The Recovery Plan builds on the progress already made at EU level to support employees, small enterprises and the economies of member states via €540 billion (SURE Instrument, ESM Pandemic Crisis Support and EIB Guarantee Fund for Workers and Businesses)[49]. The new recovery instrument of the European Commission puts forth a twofold response as €750 billion in Next Generation EU financing for 2021–2024 and a reinforced long-term EU budget for the period 2021–2027 amounting to €1100 billion. In this Recovery Plan it is proposed to provide €1.85 trillion to push the European economy forward [48,49].

Despite the high level of uncertainty, the anatomy of the economic crisis is elaborated to reach a rationale for investments and actions. Some estimates were made with respect to the economic damage caused by the crisis. According to these estimations "tourism, the social economy and the creative and cultural ecosystems" could face a more than 70% decline of turnover in the second quarter of 2020 [49].

In this respect, we analyse the Recovery Plan for the scope of its support measures for the cultural sector. Within the Plan, REACT-EU is introduced as a new initiative by the European Commission to enable cohesion policy funding for member states to respond to crises. Digital transitions, tourism and culture are among the target sectors of this support. The Commission also proposes to strengthen EU programmes including Horizon Europe, Creative Europe and Digital Europe [49]. These programmes entail instruments to support digitisation and cultural heritage-related actions.

Deepening and digitising the single market are among the policy fundamentals of the Plan, as the pandemic showed the vitality of digitisation; these technologies enabled business, services and communication. In this vein, artificial intelligence, cloud infrastructures and supercomputers will be a priority and will receive investments [49].

The Recovery Plan added a new layer to the trend of digitisation as a response to the crisis caused by COVID-19. This has implications for the cultural and creative sectors, both for greater crisis-resilience and for more cultural heritage-led innovations driven by digital technologies.

3.2.6 Public Consultation on Opportunities Offered by Digital Technologies for the Culture Heritage Sector

On 22 July 2020, the European Commission launched a public consultation to pave the way for a more responsive policy framework of digitisation and cultural heritage. The survey included the option to offer in-depth evaluations of one of the Commission's main policy tools: the Recommendation on digitisation and online accessibility of cultural material and digital preservation [50]. Also, it is possible to submit position papers.

The main motives of the consultation are to gather the views of European cultural heritage actors at large, to better grasp the importance of digitisation of cultural heritage, support processes for this and gain input for the EU policy framework. Through this consultation, the Commission asks for the contributions of member state authorities of relevance, cultural heritage institutions, international organisations, umbrella organisations of relevant stakeholders and the public [51].

The COVID-19 pandemic highlighted the importance of digitisation for the cultural heritage sector. The public consultation seeks to evaluate the impact of the pandemic on cultural heritage sector and help to erect supportive measures to capture the value of digitisation. A set of questions in the survey focus on the cultural heritage sector in the context of the crisis caused by pandemic, the importance and role of using and reusing digitised cultural heritage assets, the perception of digital transformation and specific elaborations on the Recommendation [51].

Organisations are asked questions about the impact of the pandemic on their use of online services during restrictions, their perception of the importance of digital technologies, online access and digital transformations, their current situation and future plans for using digital technologies within the social context of the crisis, and their view of the need for digital transformation in the aftermath of the crisis [51].

The public consultation is critical for shaping the policy framework for the digitisation of cultural heritage through a better grasp of the effect of the COVID-19 pandemic and offers a policy window for cultural heritage institutions and professionals at regional, European and international levels.

3.2.7 EU Research and Innovation Funding; Horizon Europe Programme

The EU funding programmes of 2014–2020 providing support for cultural heritage-related actions are the EU Structural Funds, Creative Europe, Joint Programming Initiative in Cultural Heritage and Global Change, Horizon 2020, ERASMUS+, Europe For Citizens, COST Actions, Humanities in the European Research Area (HERA) ERA-NET Cofund project [19].

Horizon Europe is the new Research and Innovation Framework Programme of EU for 2021–2027. It is the main instrument to fund research, innovation and their supportive actions for cultural heritage and digitisation. Horizon Europe is structured around three pillars (Pillar 1: Excellent Science; Pillar 2: Global Challenges and European Industrial Competitiveness; Pillar 3: Innovative Europe) and supported by measures for widening participation and strengthen the European Research Area [52].

The document "Orientations towards the first Strategic Plan for Horizon Europe" presents the results of the extensive co-design process in preparation for the Strategic Plan during 2019 [52]. The Strategic Plan is to prepare the work programmes for the first four years of Horizon Europe [53]. Until this plan, the orientations document is the source for understanding how Horizon Europe will handle research and innovation on cultural heritage and digitisation.

Cultural heritage is mostly included in Pillar 2 under Cluster 2: Culture, Creativity and Inclusive Society. The challenges for this Cluster are related to "democratic governance, cultural heritage and the creative economy, social and economic transformations" [52]. From the perspective of digitisation and innovation for promoting cultural heritage, these challenges are to take the opportunities of digital transformation to the fullest, combining traditional with cutting-edge and digital technologies and innovative techniques, and capture technical, economic and social value. The cultural and creative industries are said to be a vital source for creative economy and innovation, which need to cross-link to other sectors in the economy [52].

Horizon Europe will be the main instrument to fund research and innovation actions and cooperation among key actors of digitisation and cultural heritage across Europe. On the one hand, it has broad scope for shaping the research and innovation processes and framework conditions in support of relevant EU policy objectives. On the other hand, projects funded by Horizon Europe could feed into evidence-based policy making with regards to digitisation and cultural heritage. Horizon 2020 also plays this role for European research and innovation. Given the specific reference to cultural heritage under Cluster 2 of Pillar 2, the recent policy framework for a stronger system of innovation for cultural and creative sector, and the new momentum for enhanced digitisation given the crisis caused by COVID-19, Horizon Europe has significant scope for impact.

3.3 Discussion

Digitisation and cultural heritage are expected to gain weight on the European research and innovation policy space due to the COVID-19 crisis. The growth of advanced technologies and digitisation opens up new avenues for applying these technologies in the advanced use and reuse of cultural assets. Policy makers face a new challenge due to the COVID-19 pandemic. The first circle of response is about refocusing resources and actions to cope with the immediate challenges of the crisis. Longer-term policies will need to be calibrated due to the changes in social and economic context.

The European policy agenda in relation to cultural heritage refers to digitisation and favourable framework conditions to support creativity and innovation. Digital technologies are presented as enhancing access to and use of cultural assets, and thus as an

important driver of culture-based innovations and the resulting social and economic benefits.

The most recent policy tools and initiatives discussed in this article call for synergy among policy actors and in legal and financial frameworks (Strategy 21, New Agenda for Culture); to capture the value of a shared culture in Europe (EYCH 2018); to enable a productive ecosystem for cultural heritage innovators and innovations (Work Plan for Culture 2019–2022); and to support innovations stemming from coupling cultural heritage with digital transformation to benefit the economy and society (Strategy 21, New Agenda for Culture, Work Plan for Culture, Recovery Plan, Horizon Europe).

The COVID-19 crisis showed the immediate need to act on the digitisation of cultural heritage within a supportive policy, legal and financial framework. The public consultation launched by the European Commission on opportunities offered by digital technologies for cultural heritage is intended to offer insights within this context.
The current policy landscape provides a favourable framework to support the digitisation of cultural heritage, harnessing its economic and social benefits to combat negative effects of the COVID-19 crisis. To achieve their desired objectives and to address the community needs raised in this article, the policies need to be implemented in practice. This requires two interwoven areas of intervention: EU funding programmes and bottom-up community initiatives. Horizon Europe plays a key role in implementing DCH policy in practice, given its significant reference to digitisation and cultural heritage and planned impact trajectory.

4 State of the Art and Analysis of Legal Frameworks

4.1 Theoretical Framework

At EU level, the recent Open Data Directive [54] and the Digital Single Market Directive [55] establish the substantive political and legal framework supporting the development and the growth of digital humanities and DCH research. In the forthcoming years, both directives can be expected to strongly influence Member States' policies and legislations related to open access and the sustainable digitisation and preservation of cultural heritage assets for future generations. For cultural heritage institutions, the directives create important opportunities to exploit digitised datasets for many different purposes in galleries, libraries, archives and museums, also referred as GALM domain.

Both directives are concerned with the economic impact of the use, reuse and exploitation of digital cultural resources to contribute to economic growth and job creation. In particular, both directives falls under the Digital Single Market Strategy recently replaced by the strategy "2030 Digital Compass: the European way for the Digital Decade" [56]. In this context, the European Commission is promoting a coherent approach at EU level to improve the framework conditions for digitisation and digital preservation of the European cultural heritage assets. As Recital 65 of the Open Data Directive states "one of the principal aims of the establishment of the internal market is the creation of conditions conducive to the development of Union-wide services" [59].

In this respect, European Commission Recommendation 2011/711/EU on the digitisation and online accessibility of cultural material and digital preservation of 27 October 2011 is important [50]. The new Digital Cultural Heritage and European Expert Group [57] will provide a forum for member states' bodies and the European Commission to cooperate on digitisation, online accessibility of cultural material and digital preservation.

In this section, we draw up an inventory of related legal issues, and analyse how each issue may positively or negatively affect DCH studies and research. Our aim is to identify and develop ways to address policy, legal and ethical issues in the DCH environment.

4.2 Methodology

At European Union level, the most relevant regulatory provisions are laid down by the two key directives which govern the digitisation of the cultural heritage resources. In terms of methodological premises, norms are scrutinised and explained based using legal informatics methodology [58-60]. Legal informatics is a discipline familiar with future scenario analysis and aimed at exploiting technology to the maximum extent possible, while minimising the legal, ethical, social and economic risks. The methodology is based upon a multidisciplinary, international and comparative approach. An ex-ante and proactive analysis and assessment of matters, whether they are legal, ethical, economic or technological, contribute to determining and preventing risks and barriers, and subsequently to exploiting opportunities. The legal informatics approach is grounded in philosophy of law (e.g. legal argumentation); it constitutes sceptical analysis of positive law and intensive hermeneutic interpretation of hard and soft law. In the last twenty years, legal informatics developed as discipline by embedding legal theory (e.g. the diachronic model of law), computer science paradigms (e.g. user experience and user interface design) and principles derived from philosophy of law. As a result, Legal informatics combines expertise in different disciplines – law, ethics, economics and technology.

In the Digital Cultural Heritage domain as Jon Bing wrote it is important to develop a project to make more Cultural Heritage content available in digital form and, "establish criteria and principles for computerisation, and coordinating this (project) on a national" and EU level [61]. According to Bing "this involves libraries, but also archives and museums – illustrating the converging force of information technology". Bing maintains that "this poses new issues on several fronts". Therefore; "a methodology is required to secure a representative picture at appropriate intervals. And the legal question related to copyright in the material acquired have to be met; though the legal basis for deposit is extend to digital material, this material also should be available for researchers and other relevant users". As a result, due to its multidisciplinary and interdisciplinarity approach, legal informatics methodology it is beneficial when applied to Digital Humanities domain as it contributes to provide a common holistic approach to the digital lifecycle of Cultural Heritage datasets.

Referring to research and innovation in Digital Cultural Heritage, legal informatics methodology should be used as complementary method for the implementation of Recommendation 2011/711/EU [62] in terms of providing the general framework for digitisation, online accessibility and digital preservation of cultural heritage resources. In this respect it is crucial to mention that the EU Commission has recently sets up a Centre for digital preservation of cultural heritage aiming to preserve and conserve European Cultural Heritage and has launched projects supporting digital innovation in schools [63].

4.3 The Open Data Directive and Digitisation of Cultural Heritage

The updated Open Data (OD) Directive, EU Directive 2019/1024 [54], lays down a set of specific rules and exceptions for the datasets collected, produced, reproduced, released and disseminated by cultural institutions. The normative in this context is the rules governing the digitisation of cultural heritage assets.

In the following, we explain the most relevant regulatory provisions laid down by the OD Directive at EU level: open access, exclusive arrangements, use of standard licences, protection of personal data, principle of charging for the reuse of documents, semantic web applications (see 4.3.1) and use of artificial intelligence (AI) technologies (see 4.3.2).

The OD Directive highlights the fundamental role of cultural heritage institutions. As stated in Recital 65, "libraries, including university libraries, museums and archives hold a significant amount of valuable public sector information resources, in particular since digitisation projects have multiplied the amount of digital public domain material" [54]. DCH collections and their related metadata have economic value according to Recital 65: they constitute "a potential base for digital content products and services and have a huge potential for innovative reuse in sectors such as learning and tourism".

Open access to information and the right to knowledge are fundamental rights according to the OD Directive. Currently, we can assume that the right of access to the information along with the principle of transparency constitute common legal bases in EU member states. Indeed, in all member states both principles have a constitutional basis and are embedded in the fundamental legal framework for the administrative action and policy.

Recital 5 of the OD Directive expressively states that "access to information is a fundamental right", linking it to Article 11 "Freedom of expression and information" of the Charter of Fundamental Rights of the European Union.

In addition, the right to knowledge is a is a basic principle of democracy that covers a wider area compared with the right to access and is expressed in Recital 43 of the OD Directive. The right to knowledge implies instruments to understand, use and reuse the data. Moreover, the quality and the truthfulness of the data should be guaranteed: to cite Recital 43, "that objective is applicable to institutions at every level, be it local, national or international".

In terms of research data, Article 10 of the OD Directive supports open access policies at local level: publicly funded research data should be made openly available "following the principle of open by default and compatible with the FAIR principles" [64].

Particular attention shall be considered in relation with "intellectual property rights, personal data protection and confidentiality, security and legitimate commercial interests".

Standard licences should be used. Article 8 and Recital 44 of the OD Directive clearly states the principle that "the reuse of documents shall not be subject to conditions" unless "justified on grounds of a public interest objective". Moreover, the conditions should be "objective, proportionate, non-discriminatory" and "not unnecessarily restrict possibilities for reuse and shall not be used to restrict competition".

As a consequence, as Recital 44 continues, when the reuse of documents is subject to conditions the use of standard licences is recommended "dealing with issues such as liability, the protection of personal data, the proper use of documents, guaranteeing non-alteration and the acknowledgement of source". The standard licence is defined in Article 2 point 5 of the OD Directive as "a set of predefined reuse conditions in a digital format, preferably compatible with standardised public licences available online".

At EU level the "European Commission's guidelines on recommended standard licences, datasets and charging for the reuse of documents"[65] remain the basic document regulating the use licences. In this respect we should also consider the European Commission "Decision of 22.2.2019 adopting Creative Commons as an open licence under the European Commission's reuse policy" [66]. According to Article 1 of this decision, the Commission has adopted Creative Commons Attribution 4.0 International Public License (CC-BY 4.0) as an open license for the Commission's reuse policy. In addition, Article 2 of the Decision asserts that, "without prejudice to the preceding article, raw data, metadata or other documents of comparable nature may alternatively be distributed under the provisions of the Creative Commons Universal Public Domain Dedication deed (CC0 1.0)".

As practical option for publishing both data and content, the Open Knowledge Foundation [67] recommends Creative Commons Licences CC0 1.0, CC-BY 4.0 and CC-BY-SA 4.0 as conformant with the principles set forth in the Open Definition[68,69]. Within this framework, we should mention Europeana [70] (Europe's digital library) as an example of an organisation that releases its metadata into the public domain using CC0.

Exclusive arrangements include exclusion of the digitisation of cultural resources. The general principle of the prohibition of granting exclusive rights for the reuse of public digital datasets, except for specific conditions, laid down in Article 12 of the OD Directive on "exclusive arrangements", does not apply to digitisation of cultural resources.

Recital 49 of the OD Directive acknowledges the importance of private partnerships to facilitate and accelerate the process of digitising cultural resources and therefore the need to grant a certain period of exclusivity that "might be necessary in order to give the private partner the possibility to recoup its investment". On the other hand, paragraph 3 of Article 12 introduces notwithstanding procedural safeguards to limit exclusive arrangements up to 10 years. Accordingly, if the period of exclusivity "exceeds 10 years, its duration shall be subject to review during the 11th year and, if applicable, every seven years thereafter". Moreover, the arrangements granting exclusive rights shall be transparent and made publicly available. Finally, the cultural institution "concerned shall be provided free of charge with a copy of the digitised cultural resources

as part of those arrangement" and "that copy shall be available for reuse at the end of the period of exclusivity".

Aspects and issues related to the **protection of personal data** are to be accurately scrutinised when doing research in the DCH field. Regarding this matter the OD Directive clarifies that the reuse of datasets containing personal data shall be processed in full compliance with the General Data Protection Regulation (GDPR) [71], the Directive on privacy and electronic communications [72] and any supplementing provisions of national law.

Accordingly, the OD Directive is grounded in the concept of anonymisation of data, as stated in Article 2 point 7. Notably, emphasising the risk of identification, Recital 16 asserts that "Member States are therefore encouraged to promote the creation of datasets based on the principle of 'open by design and by default', with regard to all documents falling within the scope of this Directive. Moreover, Member States shall prevent the risk of reidentification or deanonymisation ensuring 'the protection of personal data, including where information in an individual data set does not present a risk of identifying or singling out a natural person, but when that information is combined with other available information, it could entail such a risk'". Concerning anonymisation of datasets we shall recall Article 29 of Data Protection Working Party Opinion 05/2014 on Anonymisation Techniques [73], which "acknowledges the potential value of anonymisation in particular as a strategy to reap the benefits of 'open data' for individuals and society at large whilst mitigating the risks for the individuals concerned".

Article 6 of the OD Directive on "principles governing charging" advocates the general principle that the re-use of open data datasets shall be free of charge [74]. However, this principle is not mandatory. In fact, public sector bodies still allowed to charge the marginal costs incurred "for the reproduction, provision and dissemination of documents as well as for anonymisation of personal data and measures taken to protect commercially confidential information" (Article 6, paragraph 2 1). An exception is made for libraries, including university libraries, museums and archives to charge more than the marginal costs of dissemination for the reuse of their data (Article 6, paragraph 2, letter b). The fees charged "shall not exceed the cost of collection, production, reproduction, dissemination, data storage, preservation and rights clearance and, where applicable, the anonymisation of personal data and measures taken to protect commercially confidential information, together with a reasonable return on investment" (Article 6 paragraph 5). In the scope of the OD Directive, research outputs and datasets will have to be made available online and free of charge to end users, as is stated in Recital 27 and Article 6, paragraph, 6 letter b).

Besides the OD Directive, it is worth mentioning the Digital Governance Act [75], the latest European Commission proposal to regulate the digital space in Europe. Additional relevant aspects to consider can be found in the European Data Strategy Communication [76]. These two documents point out the value of data as economic assets. Moreover, the documents raise an interesting and new concept: "data sharing: means the provision by a data holder of data to a data user for the purpose of joint or individual use of the shared data, based on voluntary agreements, directly or through an intermediary" [76, Article 2]; that enlarges the future scenarios for G2B or B2G (government to business or vice versa) reusers of data. However, neither documents specifically refer to or dedicate space to cultural heritage (although they do refer e.g. to an Open Science Data Space).

Technological issues for open DCH datasets in the semantic web must also briefly be considered [77]. Technological methodologies that enable the opening, releasing and dissemination of reusable public DCH datasets and ensure their interoperability in the semantic web are needed.

4.3.1 European Data Strategy: Technological and Semantic Web Applications

As defined in the Open Data Handbook [78], "interoperability denotes the ability of diverse systems and organisations to work together (interoperate), to cooperate, to exchange information automatically, to interact seamlessly anywhere, anytime on the base of common rules". In the case of open data, interoperability is the ability to interoperate – or intermix – different datasets. «The core of a "commons" of data (or code) is that one piece of "open" material contained therein can be freely intermixed with other "open" material. This interoperability is key to realising the main practical benefits of "openness": the dramatically enhanced ability to combine different datasets together and thereby to develop more and better products and services. Providing a clear definition of openness ensures that when you get two open datasets from two different sources, you will be able to combine them together, and it ensures that we avoid our own 'tower of babel': lots of datasets but little or no ability to combine them together into the larger systems where the real value lies» [79].

Accordingly, Recital 34 of the OD Directive reads: «to facilitate reuse, public sector bodies should, where possible and appropriate, make documents, including those published on websites, available through an open and machine-readable format and together with their metadata, at the best level of precision and granularity, in a format that ensures interoperability». In Recital 16, the machine-readability recommendation is stressed jointly with the principles of "open data by design and open by default" to be applied to the creation of all the datasets falling within the scope of the OD Directive [80]. This means designing information systems capable of automatically extracting datasets in open data format.

Article 2 of the OD Directive defines a format as machine-readable when the «file format structured so that software applications can easily identify, recognise and extract specific data, including individual statements of fact, and their internal structure». Additionally, Article 2 defines "open format" as a «file format that is platform-independent and made available to the public without any restriction that impedes the reuse of documents». Finally, in Article 2 «formal open standard means a standard which has been laid down in written form, detailing specifications for the requirements on how to ensure software interoperability» [81].

In the light of all these legal provisions, from a technical perspective, in the semantic web environment, there are four main principles to consider:

1. Open formats;
2. Metadata;
3. Ontologies;
4. Persistent Uniform Resource Identifiers (URIs).

Besides the legal definition, in computer science "open formats" also mean well documented, easily applicable, non-proprietary data representations, neutral with respect to the technology environment. Examples of open formats are: CSV, JSON, XML and RDF [68].

The dataset itself is not enough to ensure reusability: semantics also play a role. Two more elements are necessary: metadata and ontologies. Metadata corresponds to information on the dataset that is machine understandable in the semantic web platform [82] and expressed according to standard vocabularies to facilitate searching and interoperability. Without metadata, the dataset is only a list of values without meaning and contextualisation. Without precise metadata, reuse can produce corrupted results and datasets are prone to the manipulation, mystification and misinterpretation. One of the most important methods for providing metadata is RDF, that permits making assertions on the main source using simple triple: subject (the entity being described), predicate (relationship) and object (a value or another entity associated within the relationship).

A paradigmatic example of ontology is DCAT [83] that "is an RDF vocabulary" developed by W3C "designed to facilitate interoperability between data catalogues published on the Web". Besides the datasets, sometimes it is fundamental to annotate also the schema, the vocabulary and taxonomies. ADMS [84] is a specific application of DCAT, used to describe semantic assets defined as highly reusable metadata (e.g. xml schemata, generic data models) and reference data (e.g. code lists, taxonomies, dictionaries, vocabularies) that are used to develop eGovernment systems. In this way, we can describe the dataset (e.g. with XML), the metadata of the dataset (e.g. with DCAT) and finally the vocabulary or schema for interpreting the dataset (e.g. with ADMS). A computational ontology is the abstract representation a specific domain using classes, attributes and relationships [85]. A computational ontology sets up a semantic model of a domain of the reality that, when shared inside a community, can create a common meaningful map of concepts. In addition, when using axioms, it is possible to create inferential rules about the objects connected to the classes of the ontology.

The possibility to have persistent, meaningful, semantic URIs for each different web resource is the main method to make RDF and ontology statements actually useful.

By managing these components it is possible to create an interoperable infrastructure that can be connected with the constellation of data in the semantic web, defined by Tim Berners-Lee as "a web of data that can be processed directly and indirectly by machines" [86]. "The Semantic Web is a Web of Data – of dates and titles and part numbers and chemical properties and any other data one might conceive of" [86]. The semantic web stack [87] (URI, XML, RDF, OWL, Logic, Proof, Trust) is meant to provide a complete environment where data can be referenced, modelled, enriched, inferenced and associated to their provenance.

The linked open data [88] methodology provides the best way to publish datasets and is particularly suitable for releasing DCH datasets.

Briefly, linked open data publication requires four rules:

1. To provide a persistent URI for each dataset;
2. The URI should be based on http;
3. Use RDF metadata connected to the dataset;
4. Reuse other ontologies when appropriate.

Linked open data is the accepted best practice worldwide for open data; however it is not easy to implement, so it is possible to apply this paradigm step by step following Tim Berners-Lee's five-star method [89]:

1. Provide the dataset on the web with an open license;
2. Provide the dataset in machine-readable open format;
3. The open format should be non-proprietary;
4. Link the data to RDF metadata;
5. Link the data to other data available in the linked open cloud.

All in all, we can surely assert that publishing datasets in the Cultural Heritage domain [90] adopting the principles of Linked Open Data, is an ethical imperative to support the full scholarly exploration and interconnection of the artefacts and assets of our heritage and is a key requirement for their sustainable preservation for our future generations.

4.3.2 AI-Related Technologies in the Cultural Heritage Sector

Finally, several points of the OD Directive emphasise the potential role of AI in the full economic exploitation of public open datasets. Recital 10 asserts that "the amount of data in the world, including public data, has increased exponentially and new types of data are being generated and collected" and that "there is a continuous evolution in technologies for analysis, exploitation and processing of data, such as machine learning, AI and the internet of things". These include "distributed ledger technologies", as added in Recital 13.

Another important reference to mention is the White Paper on AI proposed by the European Commission [91]. The White Paper defines AI as an "ecosystem that brings the benefits of the technology to the whole of European society and economy" [91 p. 2], for citizens in order to have better public services, for business in the tourism sector, and for public administration to reinforce the public interest, as in transport and education.

Recently the EU Commission has enacted a proposal for a Regulation laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) [92].
Article 3 point 1, of the proposal states that "artificial intelligence system (AI system) means software that is developed with one or more of the techniques and approaches listed in Annex I 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". Annex I [92] clearly lists the following AI techniques and approaches: (a) Machine learning approaches, including supervised, unsupervised and reinforcement learning, using a wide variety of methods including deep learning; (b) Logic- and knowledge-based approaches, including knowledge representation, inductive (logic) programming, knowledge bases, inference and deductive engines, (symbolic) reasoning and expert systems; (c) Statistical approaches, Bayesian estimation, search and optimization methods. As it is pointed put in the Explanatory memorandum of the Proposal the promotion of AI-driven innovation is closely linked to the abovementioned Data Governance Act, the Open Data Directive and other initiatives under the EU strategy for data, which will establish trusted mechanisms and services for the

re-use, sharing and pooling of data that are essential for the development of data-driven AI models of high quality.

AI applications using open data datasets made available by Libraries, Archives, Museums, could significantly improve studies and research in the Digital Humanities domain. Cultural heritage institutions at large will benefit at different levels from using AI-related technologies. Besides the digitisation of cultural heritage resources, AI leads the way to enhance the quality of datasets and their related metadata, to analyse and process an enormous amount of data and consequently, to preserve cultural heritage for the next generations.

However, AI applications give rise to numerous legal, ethical and technical issues that should be assessed according to the requirements set forth in the Ethics Guidelines for Trustworthy AI framed by the High-Level Expert Group on AI [93].

4.4 The Directive on Copyright and Related Rights in the Digital Single Market

EU Directive 2019/790 on the Digital Single Market (DSM) [55], hereinafter the DSM Directive, was designed to reform copyright laws that had become inadequate in an increasingly digital environment. This Directive is the first broad review of copyright in the European Union. It aims to harmonise copyright in the EU, and to update the copyright framework. As it is clarified in the Explanatory Memorandum of the Directive "the evolution of digital technologies has changed the way works and other protected subject matter are created, produced, distributed and exploited. New uses have emerged as well as new actors and new business models" [94, Article 2]. Recital 5 more specifically asserts that "in the field of research, innovation, education and preservation of cultural heritage" digital technologies permit new types of uses that are not clearly covered by the existing EU rules.

In the following paragraphs, we outline the most relevant provisions of the DSM Directive for cultural heritage institutions: text and data mining, preservation of copies, use of out-of-commerce works by cultural heritage institutions, collective licensing with an extended effect and works of visual art in the public domain.

4.4.1 Text and Data Mining

As defined in Article 2 paragraph 2 of the DSM Directive, text and data mining (TDM) "means any automated analytical technique aimed at analysing text and data in digital form in order to generate information which includes but is not limited to patterns, trends and correlations". A further definition is found on the website of the UK Intellectual Property Office: "text and data mining is the process of deriving information from machine-read material. It works by copying large quantities of material, extracting the data, and recombining it to identify patterns" [95].

It is therefore evident that the metadata provenance should be extended to TDM activity and this technical measure is an important complementary instrument for explaining the lifecycle of intellectual property rights and proving the origin of the data extracted from copyrighted collections. This is especially recommended when multiple resources are combined using TDM techniques.

According to Article 3 of the DSM Directive, member states should make an exception for "extractions and reproductions" of copyright protected works to which they have lawful access in order to allow "text and data mining activities" carried out by "research organisations and cultural heritage institutions". Under this exception "copies of works or other subject matter made in compliance with paragraph 1 shall be stored" by the cultural heritage institutions "with an appropriate level of security and may be retained for the purposes of scientific research, including for the verification of research results".

According to Article 4 of the DSM Directive "Member States shall provide for an exception or limitation" for anyone, individuals or cultural heritage institutions, for any purpose, to benefit from an exception to copyright for text and data mining of legally accessed works. However, in this case rightsholders will have the possibility to expressly reserve this right "in an appropriate manner, such as machine-readable means in the case of content made publicly available online". Finally, if the TDM is copyrighted itself the previous exceptions are limited by the existing InfoSoc Directive [96].

4.4.2 Preservation of Cultural Heritage: Exception for Preservation Copies

For a long time, the digital preservation of cultural heritage material has been a central policy of the EU. Now, the majority of member states report a variety and combinations of action plans, strategies and initiatives for the long-term preservation of digital material. Article 6 of the DSM Directive makes it mandatory that "Member States shall provide for an exception […] the rights in order to allow cultural heritage institutions to make copies of any works or other subject matter that are permanently in their collections, in any format or medium, for purposes of preservation of such works or other subject matter and to the extent necessary for such preservation".

4.4.3 Use of Out-of-commerce Works by Cultural Heritage Institutions

Articles 8–11 and the corresponding recitals 29–43 of the DSM Directive lay down the provisions aimed at authorising the cultural heritage institutions to make available out-of-commerce works in the institutions' permanent collections. Article 8 paragraph 5 defines that out-of-commerce works are "work or other subject matter […] when it can be presumed in good faith that the whole work or other subject matter is not available to the public through customary channels of commerce, after a reasonable effort has been made to determine whether it is available to the public".

According to Recital 29 "works and other subject matter should be considered to be permanently in the collection of a cultural heritage institution when copies of such works or other subject matter are owned or permanently held by that institution, for example as a result of a transfer of ownership or a licence agreement, legal deposit

obligations or permanent custody arrangements". As stated in Article 8 collective management organisation "may conclude a non-exclusive licence for non-commercial purposes with a cultural heritage institution for the reproduction, distribution, communication to the public or making available to the public of out-of-commerce works or other subject matter". Collective management organisation may conclude the agreement with the cultural heritage institution on condition that: "(a) the collective management organisation is, on the basis of its mandates, sufficiently representative of rightsholders in the relevant type of works or other subject matter and of the rights that are the subject of the licence; and (b) all rightsholders are guaranteed equal treatment in relation to the terms of the licence".

Therefore, Article 10 lays down "publicity measures" to ensure that in both cases rightsholders are able to prevent cultural heritage institutions from making their works available. Article 10 than states that the European Union Intellectual Property Office establishes and administers a "public single online portal where cultural heritage institutions and collective management organisations must publish information about the out-of-commerce works […] six months before they make the works available online".

To prevent liability issues with rightsholders, Recital 42 and Article 11 of the DSM Directive specify a set of provisions to ensure that member states establish a "stakeholder dialogue". In this respect Article 11 specifies that "Member States shall consult rightsholders, collective management organisations and cultural heritage institutions in each sector before establishing specific requirements pursuant to Article 8(5)". Moreover, Article 11 continues that member states "shall encourage regular dialogue between representative users' and rightsholders' organisations, including collective management organisations, and any other relevant stakeholder organisations, on a sector-specific basis, to foster the relevance and usability of the licensing mechanisms set out in Article 8(1) and to ensure that the safeguards for rightsholders referred to in this Chapter are effective".

4.4.4 Collective Licensing with an Extended Effect

Article 12 of the DSM Directive contains provisions on collective licensing with extended effect that are quite similar to and inspired by the models of extended collective licensing (ECL). This is meant to ensure that member states implementing the DSM Directive in the domestic legislation, "may provide, as far as the use on their territory is concerned and subject to the safeguards provided for in this Article, that where a collective management organisation that is subject to the national rules implementing Directive 2014/26/EU [97], in accordance with its mandates from rightsholders, enters into a licensing agreement for the exploitation of works or other subject matter".

Member states shall provide safeguards that are set down in Article 12 paragraph 3 to ensure that the ECL mechanism "is only applied within well-defined areas of use, where obtaining authorisations from rightsholders on an individual basis is typically onerous and impractical to a degree that makes the required licensing transaction unlikely, due to the nature of the use or of the types of works or other subject matter concerned, and shall ensure that such licensing mechanism safeguards the legitimate interests of rightsholders".

4.4.5 Protection of Public Domain Works and Visual Art

According to Article 14 of the DSM Directive "when the term of protection of a work of visual art has expired, any material resulting from an act of reproduction of that work is not subject to copyright or related rights, unless the material resulting from that act of reproduction is original in the sense that it is the author's own intellectual creation".

Recital 53 of the Directive clearly explains the rationale of Article 14 in the field of visual art: "the expiry of the term of protection of a work entails the entry of that work into the public domain and the expiry of the rights that Union copyright law provides in relation to that work". In the visual arts, circulation of faithful reproductions of works in the public domain contributes to the access to and promotion of culture and cultural heritage. In a digital environment, the protection of such reproductions through copyright or related rights is inconsistent with the expiry of the copyright protection of works. In addition, differences between the national copyright laws governing the protection of such reproductions give rise to legal uncertainty and affect the cross-border dissemination of works of visual arts in the public domain. Certain reproductions of works of visual arts in the public domain should, therefore, not be protected by copyright or related rights" [55, Recital 53]. However, cultural heritage institutions remain free to sell reproductions, such as postcards, posters and books.

For the sake of completeness, we should point out that the DSM Directive has provided specific disciplines for "the protection of press publications concerning online uses" in Article 15 and on the "use of protected content by online content-sharing service providers" in Article 17. In these cases, care is needed to ensure that the safeguards for libraries in the Directive are present in national implementation.

Title II of the DSM Directive introduces "measures to adapt exceptions and limitations to the digital and cross-border environment" [55, Title II], also concerning cultural heritage.

4.5 Discussion

We can forecast that in the coming years the digital data policy and strategy of the EU member states will be strongly affected by transposition of the OD Directive and the DSM Directive, together with the upcoming Digital Governance Act. As a consequence, member states, both at central and local level, should adopt transparent, clear, coherent, applicable and effective legal provisions, in order to ensure the development of a robust and mature digital data market in the EU.

Accordingly, the European Commission should monitor progress, at member state level, in terms of digitisation, online access and digital preservation of DCH assets. The monitoring should focus on how member states transpose the two directives and implement the Recommendation on the digitisation and online accessibility of cultural material and digital preservation [98]. Both directives leave room to different degrees of transposition into the domestic legislative system of the member states. Notably, as to Recital 64 of the OD Directive "the Commission may assist the Member States in im-

plementing this Directive in a consistent way by issuing and updating existing guidelines, particularly on recommended standard licences, datasets and charging for the reuse of documents, after consulting interested parties".

In this respect, several relevant issues related to supporting digital humanities and cultural heritage studies research must be pointed out.

The issue of licences is increasingly essential, since the Public Sector Information Directive 2013/37/EU [99] has been extended in scope "to libraries, including university libraries, museums and archives". Particularly, in the light of the Commission Decision adopting Creative Commons [100] as an open license to enable European Commission's reuse policy [cf. 101], it is fundamental to scrutinise the legal implications of transposing this measure within the EU legal framework. In this respect it is necessary to recall the critical issues related to the possibility that re-copyright of a dataset available in the public domain may deprive public sector bodies of an important asset. Thus, specific attention must be paid to governance of the use of the CC0 as a standard licence.

In terms of competition law, it is important to consider the implementation of the provisions on charging and exclusive arrangements to avoid market distortions at EU level. Implementation of ECL is territorial, so this can potentially distort market competition in the cultural heritage context. In this respect, member states' competition authorities will play an important monitoring role.

Considering the impact of the DSM Directive on the member states' legislations, Recital 5 states that "in the fields of research, innovation, education and preservation of cultural heritage, digital technologies permit new types of uses that are not clearly covered by the existing Union rules on exceptions and limitations". Moreover, according to Article 1, the "Directive lays down rules which aim to harmonise further Union law applicable to copyright and related rights in the framework of the internal market, considering, in particular, digital and cross-border uses of protected content. It also lays down rules on exceptions and limitations to copyright and related rights, on the facilitation of licences, as well as rules which aim to ensure a well-functioning marketplace for the exploitation of works and other subject matter".

In respect of AI, explicability is one of the key principles. The principle is introduced by the High-Level Expert Group on AI of the European Commission with the intention to reinforce its ethical instruments in the AI domain and to support transparency, accountability of the automatic decision system and auditability of the black box of algorithms. Explicability in this definition also applies to the lifecycle of DCH datasets: this should be traceable, transparent in the semantic and in the data model, and transparent in provenance and in modifications over time. This means explaining the method of anonymisation, the algorithm of aggregation, the model of classification of the datasets and the training set in cases of machine learning or deep learning.

In addition, the principle of knowability of the dataset used by the AI process is relevant, as it enables each data subject to act in accordance with Article 22 of the GDPR in the event that cultural data (e.g. museum visit data) are used against the individual (e.g. if all people attending a particular exhibition are classified according to the ideological opinions of the artist).

The White Paper on AI proposed by the European Commission [91] is an additional significant reference to mention. The White Paper defines AI as an "ecosystem that brings the benefits of the technology to the whole of European society and economy" [91 p. 2], for citizens to have better public services, for business in the tourism sector and for public administration to reinforce the public interest as transport and education. As a consequence, AI applications using open DCH datasets could significantly improve education, tourism and transportation – and thus quality of life.

Finally, cultural heritage institutions need to adopt a data ethics policy to ensure responsible and sustainable reuse of open datasets. Implementing a data ethics policy constitutes a step forward besides the compliance with the legal framework on this issue, e.g. the GDPR [102]. In this respect rules and technical mechanisms need to be defined to detect cognitive bias in the creation of the dataset in order to avoid discrimination, stereotyping, crystallisation, distortion of history, misrepresentation of reality and manipulation of the cultural identity of a country or a community. A data ethics policy is crucial to good practices around how data is collected, reused and shared. This is of particular relevance when data activities have the potential to impact on people and society, directly or indirectly. Specifically regarding AI-related applications it is essential to prevent cognitive bias in the creation of datasets.

5 Conclusions

Through recent policies and initiatives, the EU has sought to develop a holistic and complementary approach to create a strong system for cultural heritage-led innovations across Europe. At the EU level, legal initiatives and directives forms a supportive framework for digital humanities and digitisation of cultural heritage with the associated benefits of digitised assets. This setting could be said to be a conducive environment for European-scale services and intervention to facilitate community engagement in digitisation of cultural heritage.

A critical mass of policies and legal initiatives aim to support digitisation of cultural heritage and exploit its benefits. The EU has sought to create favourable and supportive structures and conditions for this in terms of access to finance, legal framework, enhanced skills, online accessibility, standardisation, citizen engagement and tailored policies. The COVID-19 crisis is expected to further enforce new business models and innovation support mechanisms to stimulate digital transformations and innovations. This context sets highly favourable framework conditions for capturing the value of digitisation and cultural heritage of Europe for innovation and creativity.

Horizon Europe, together with other Union Programmes, plays a critical role here as the funding it mobilises can be directed to develop and disseminate legal standards in relation to digitisation and access to data, copyright issues, access to finance and scaling up cultural heritage-led innovations for market uptake, strengthening the innovation ecosystem for the cultural and creative sectors.

This context can also be seen as an opportunity to fertilise research and innovation policies, legislative frameworks and funding structures to make a greater impact on innovation performance in Europe.

The analysis presented in this article is bounded within the contextual framework and based on a community use survey, but not on impact assessment of the policy and funding landscape. The policy and legal frameworks have not yet been evaluated at a sufficient scale to determine their role and influence on practice, such as funding. Future researchers could examine the effect of restructuring on research and innovation ecosystems and seek to meet the community needs identified in the survey.

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