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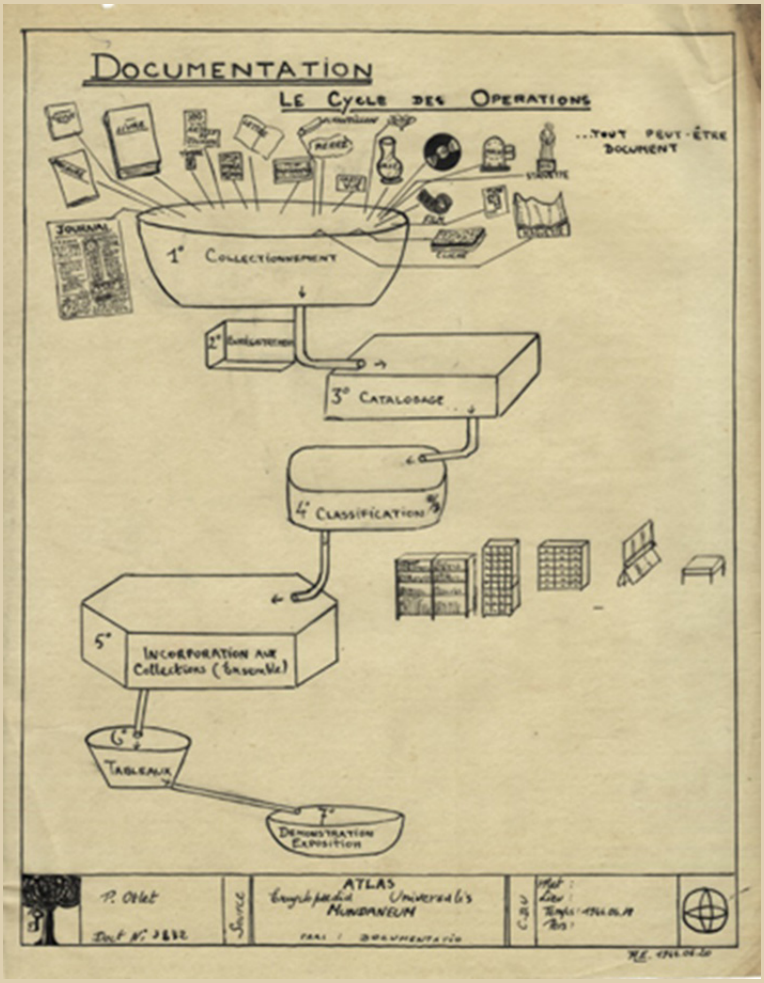

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AIDAinformazioni

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A humanistic approach to *datafication*

Two case studies: digital and digitized

Valeria Federici*

Abstract: The term *datafication* has the ability to embrace a series of aspects that span from the field of computer science to social and cultural studies. While the process of *datafication* (taking aspects of life and turning them into data) is surrounded by a lure of abstraction and neutrality; similarly to other computational processes, *datafication* reflects cultural biases, flaws, and implications that affect knowledge and knowledge production. This article explores datafication as related to the semantic web, web ontologies, and other systems of classification as both method and structure of art historical analysis. By analyzing two digital repositories that run on MediaWiki, the goal of this investigation is to incentivize a model that, under the umbrella of digital art history, unifies aspects pertaining to digital curatorship and digital preservation. The two case studies are: *The History of Early American Landscape Design (HEALD)* and *The Educational Encyclopedia of Digital Arts (EduEDA)*.

Keywords: Datafication, Semantic Web, Web Ontologies, Digital, Digitized.

1. Introduction

In her book *The Age of Surveillance Capitalism*, Shoshana Zuboff defines *datafication* as «the application of software that allows computers and algorithms to process and analyze [data]» (Zuboff 2019, 187-188). *Datafication* is «a technological process that turns several aspects of the life of an individual, a group, or a society into data. *Data is then turned into information* that acquires new values, including economic value» (Treccani 2020, Emphasis added)[1]. The term *datafication* thus has span from the field of computer science to social and cultural studies (Zuboff 2019). This article explores *datafication* in relation to the use of the semantic web, web ontologies, and other classification systems as both methods and structures of art historical analysis. In

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[1] Also, the term *Datafication* appeared in the Italian newspaper "La Repubblica" as early as 1986 (Translated by the author).

particular, it investigates two case studies: the *HEALD*, which is a project by the Center of Advanced Study in the Visual Arts of the National Gallery of Art in Washington, D.C.; and *The Educational Encyclopedia of Digital Arts* (*EduEDA*), a collective effort with numerous media partners, supported by both the Academy of Fine Arts of Carrara and of Florence, Italy. Since these two projects are both built using MediaWiki, the open access software than runs Wikipedia, they are analyzed in conversation with one another, in order to investigate the potential and the limits of data-driven analysis as offered by an open access platform. Specifically, the article delves into the implications of using the semantic web and standardized vocabularies to apply meaning to data, making it readable first by machines and then by humans.

In the first case study, I analyze how the latest upgrade to the digital repository *HEALD* enhanced the use of semantic web to foster investigation of the material available on its platform and to support its preservation. *HEALD* can be considered as a repository of digitized items, i.e. physical objects that underwent a process of digitization to be made available digitally. Since developments in digital technology are rapidly evolving, the upgrade helped address technological obsolescence as an endemic issue in digital formats and frameworks. Such developments often bring changes and mandatory updates that impact the way we can or cannot use a platform that originally seemed to serve our digital goals well, and for the longest time. Despite our best intentions, at an early stage of a digital project's life, we might be already looking for alternative digital formats, new databases, or an entirely new *host* in order to give our project a new virtual life. On the one hand, a solution can be to create a dataset that uses standardized parameters and ontologies in order for content to remain available in the future, and/or to be safely migrated to a new platform. On the other hand, standardization would carry over some implications as well as the question of how to preserve the work's original context, i.e. the digital environment in which the project, or the artwork, was first created. Overall, this analysis offers a way to deal with these implications.

In the second case study, I explore *EduEDA*, *The Educational Encyclopedia of Digital Arts*. Originally called WikiARTpedia – a project that received an Honorary Mention at the Ars Electronica Festival of Linz, Austria in 2009 – in 2012, WikiARTpedia became *EduEDA*, an encyclopedia of new media arts and a research platform for networks dedicated to information technology cultures. As expressed on the project website, the main goal of *EduEDA* is «to create a national and international network of people and institutions in order to collaboratively promote and disseminate digital arts» (EduEDA 2022). The idea of an interconnected repository of new media art is certainly in line with the vision of early Internet communities as expressed initially by the creator of the World Wide Web Berners-Lee, since it fosters collaborations as well as horizontal and collective forms of knowledge production. A vision then car-

ried out by the project Linked Open Data, which had been joined by several cultural institutions and museums over the course of the years (Berners-Lee 2006). As illustrated by the initiator of *EduEDA* Tommaso Tozzi – who is an artist and a pioneer of new media art – in order to maintain the collective character of the project, it was necessary to adopt an open source software that allows everyone to contribute. *EduEDA* does not contain artworks, but links to websites that store the artworks, built by artists themselves or by institutions. The platform also includes a link to the artwork's profile page, which at times features still images. *EduEDA* is here considered mainly for its crossed research tool, as well as for being an example of early digital curatorship. It is only partially a repository of digital items, or so-called digital-born objects. As we will see over the course of this article, *EduEDA* hosts links to either *reproduced* or *duplicable* items (Ippolito 2008, 118)[2]. This distinction is of particular interest for digital curatorship.

Others have discussed digital curatorship at length, giving many possible solutions to display and investigate digital work. Christiane Paul's curatorial approach for digital art is certainly still a beacon for this discipline (Paul 2008). In addition, I consider Ippolito's characterization of digital work in relation to the possibility of reproducing or simulating obsolete technology. In general, I endorse a case-by-case approach to the artefact, where a strategy for display and conservation is developed, whenever possible, in collaboration with artists and makers. When this is not possible, such as in the case of *HEALD*, it is still necessary to clarify that the work has been digitized and to provide details of the process. I will return to the issue of digital vs digitized later in this article, and in the conclusions. Broadly speaking, since operating within the digital realm implies similar challenges for artists, curators, digital humanists, and researchers, this article attempts to offer a roadmap for the investigative fruition of digital content.

This digital art historical study draws from a lineage of scholarship rooted in media studies, which can provide an insightful analysis of the practices and methodologies employed in the field of digital art history and, most importantly, their ramifications. Stemming from this approach, *datafication* is here intended both as a structural aspect of information technology, as well as a cultural one. By considering the epistemological umbrella under which data acquires value, this approach invites a reflection on how data is collected and made available in the field of the digital humanities and digital art history, and advocates for an active role of the humanists in shaping digital methodological practices. This translates into a non-hierarchical and dialogical relationship between information technologies and the humanities, meaning that objects,

[2] Ippolito writes: «We chose the term "reproduced" for any medium that loses quality when copied, including analog, prints, photographs, film, audio, and video […] In contrast, we reserved the word "duplicable" for media that can be cloned».

object production, and consumption through information technology, are considered in material and historically contextualized terms. Drawing from existing tools and experiences, the goal of the article is to find a path – through a humanistic lens on *datafication* – to reconcile practices and methodologies that regard digital and digitized artworks as distinct, even though they share the same data-driven mediums and are influenced by the same lucrative *technological solutionism* (Morozov 2013). This approach is not conclusive; rather, it attempts to demonstrate how theories rooted in media studies can enhance a humanistic approach to digital tools and help explain the premises and outcomes of digital art history projects.

The field of media studies has eloquently illustrated how the digital realm has been characterized by a series of catchy words and phrases that rarely have clear meanings. Datafication, network, media, digital, and algorithms are terms that have multiple connotations but remain elusive, often adopted interchangeably. For instance, Wendy Chun (2011) noted as the term *network* is used as a placeholder for interconnectivity, sociality, or simply the Internet. Chun explains how through a series of linguistic metaphors all media become more transparent. By becoming more transparent, they tend to blend with the environment and to become invisible, and their significance becomes even more occult. Transparency is here intended not only as the ability of media to fit within our surroundings (for instance by being portable), but also as their ambition to predict our actions or reactions, in order to be smoothly assimilated into our life (Schäfer and van Es 2017). This alleged transparency allows media to run without their process being fully explained or questioned. Rather, the process is often regarded as *magic* or outside of human control (Morozov 2013), while the working of machines has been mythologized, and locating agency within digital tools remains an open controversy (Bucher 2018, 52, 60). As I argued elsewhere, a similar process applies to data (Federici 2022).

As Artificial Intelligence moves into the realm of the Digital Humanities, these aspects become more and more relevant. For instance, while speaking about Artificial Intelligence, Jonnie Penn traced this metaphorical trend back to 1976, when it was noted that «words […] served as "incantations" for a desired result, rather than sober descriptions of a mechanism or function» (Penn 2021, 338). Data, network, and algorithms are often surrounded by a lure of abstraction and neutrality. Abstraction is here intended as a process through which it seems possible, or enticing, to conduct scientific analysis divested of human subjectivity. Similarly, neutrality refers to the alleged ability of data to represent evidence through indexicality – a direct connection between the object represented and its record – as if there were no interpretation in the process of displaying content and visualizing data. However, as shown in this study and elsewhere, the opposite mechanism takes place when working with data, and in particular with the semantic web. In fact, notwithstanding the

misleading narrative around information technology and its processes, the mechanisms behind those afore-mentioned terms are achieved through complex preparation, selection, and elaboration. In other words, they are highly mediated. For instance, standardized vocabularies, or ontologies, which are used to apply semantic meaning to data for the machine to read and interpret a given information, are achieved through a linguistic selection that is, above all, cultural, and entails compromise, and standardization. The same linguistic selection can, at times, obliterate historical presence or exclude underrepresented individuals or groups.

Standardization in computational process derives from the nineteenth century pursue of mechanical objectivity (Daston and Gallison 1992; Porter 1995) and it requires the same scrutiny as any other operations in the digital realm. Such scrutiny is possible through an understanding of how these processes work. As it has been noted, in order to successfully combine quantitative research within the humanities, digital art historians have been relying on old models of art historical investigation (mostly revitalizing Panofsky's concept of iconography or Warburg's approach to image association) that have been surpassed by new theories in art history. These old methods are linked to a determinist approach to computing and its use for quantitative analysis, that precludes new paths of investigation (Näslund and Wasielewski 2021). In addition, such approach prevents a thorough analysis of how digital tools operate or can operate. This reflection on the deterministic outcomes of standardization should impinge the mythological aura that surrounds media in general, and digital tools in particular. Dialogically, it should also help to question methodologies in the humanities, in order to flag biases and assumptions.

Along with media theories and art historical methodologies, the premises of this article are indebted to the many who have poignantly analyzed the manifold aspects and interconnections between the Digital and the Humanities, the so-called digital turn (or computational turn), under a methodological and ontological lens. Fundamental is certainly the distinction that Joanna Drucker drew between *data* and *capta* (Drucker 2011), the former indicating the information given (potentially available), and the latter the information taken (collected and elaborated in order to be made available). Drucker invites us to consider data as something constructed, extrapolated, originated by choices, compromises, and therefore *prepared*. Data cannot be considered as an absolute value, and the term *capta* serves to clarify its actual forms and uses. *Capta* is therefore the data that has been turned into information, it is the data we work with.

The contributors to the volume *Raw data is an oxymoron* have exposed that there is no data divested of meaning (Gitelman et al. 2013). A concept carried on further by Taina Bucher's analysis of the algorithm (which, as she argues, should be rather considered in the plural form *algorithms*) as well as by Evgeny

Morozov's observations on the afore-mentioned *technological solutionism*, or the belief that computing has a solution to everything (Bucher 2018; Morozov 2013). On a similar note, as observed by Sven Spieker, the «archive does not record experience so much as its absence» (Spieker 2008, 3). Therefore, as part of a critical approach to data, it is mandatory to consider not only what data shows, but also what it does not show. A claim that has also been made by Stephanie Porras when speaking about the network visualization of archives (Porras 2017). Manovich's approach to data as a medium, along with his concept of *Cultural Analytics,* emphasizes the implications of computing as a technology of culture (Manovich 2020) while Theodor Porter had previously defined quantification as a *social technology* and clarified that it emerged much earlier than the digital turn took place, revealing a longstanding tradition of quantitative analysis that spans over three centuries (Porter 1995, 50). It has been extensively observed how the computational turn in the humanities forced us to rethink how to utilize digital tools and methodologies by attempting to incentivize interdisciplinarity and push for human intervention. The edited volume *Research Methods for the Digital Humanities* has already introduced a compelling scope to «expand the field [...] rather than establish definitive boundaries» (Levenberg et al. 2018, 2). Finally, the «decolonial turn in data and technology» as highlighted by Nick Couldry and Ulises Ali Mejais (2021), is another stepping stone for conducting research in the realm of the digital and digital knowledge production. This leads us to reflect on and rethink standardization as it is currently possible through *datafication*.

This article and its outcomes stand on the shoulders of those analyses and approaches, with a particular focus on MediaWiki for its employment of the semantic web and its characteristic of being an open access platform based on the possibilities of sharing information, creating communities for scholarship, and working collectively. I explore these aspects further in the sections that follow. The two case studies under consideration serve to discuss, and eventually to attempt to come to terms with aspects of the digital realm that pertain to both digital-born (digital) and non-digital-born (digitized) artefacts, in order to contribute critically to the making and usage of digital tools by embracing complexity rather than standardization, by emphasizing processes, and by operating openly within the limitations of the tools used. This investigation thus suggests the possibility of intertwining *digitized* art history, *digital* art history, digital curatorship, and digital preservation. While the first two concepts, borrowed by Johanna Drucker, have been extensively analyzed, all these fields of investigation remain separate from one another (Drucker 2013; Brown 2020). As mentioned, this article ultimately ponders the benefits of a cross-pollination among them to potentially become one expanded field that draws from the experiences and implications of working within the digital realm.

2. HEALD – History of American Landscape Design

The digital resource *HEALD* pertains to «the language of early American landscape aesthetics and garden design in the colonial and national periods» (HEALD 2021a)[3]. *HEALD* combines thousands of texts with more than 1700 images from collections across the United States. The goal of the project is to «trace the development of landscape and garden terminology from British colonial America to the mid-19th century». As mentioned, *HEALD* runs on MediaWiki, an open access software based on JavaScript (and its derivatives). *HEALD* main structural features (database, editor, interface) were upgraded in order to adopt standardized semantic ontologies to ensure the usability, interoperability, and longevity of data (HEALD 2021b)[4]. *HEALD* online content is organized into three main categories: *keywords*, *places*, and *people*. Content was enriched with metadata (by using Semantic MediaWiki or SMW) in order to represent the complex relationships between these three categories, while the MediaWiki software was customized through extensions. Extensions are parts of the MediaWiki software, often coded or edited by computer scientists and a community of software engineers that keeps MediaWiki up to date and functional. For the most part, in line with MediaWiki open access policy, extensions are shared openly and widely (MediaWiki 2024a)[5].

In *HEALD*, a specific term (*keyword*) is described through its usage in common texts (letter, inventory, surveys, diaries) or by citations in dictionaries, treaties, and published material; as well as through its relationship to visual sources, which are categorized into *inscribed*, *associated*, or *attributed*[6]. The relationship between keywords and historic visual documents was first established in the book on which the repository is based (O'Malley 2010), while additional relationships were formulated following an analysis of the specificity of the content in a digital environment. At the same time, similarly to a dictionary or an encyclopedia, the repository includes descriptive pages pertaining to *keywords*, *places*, and *people*. A descriptive page for a keyword helps define how and when the term emerged and how it changed overtime. A descriptive page of a place and/ or of a person, traces and contextualizes their history. Descriptions have been written by multiple contributors over

[3] This investigation stems from my experience working on *HEALD* in collaboration with the Director of the project and former Associate Dean Therese O'Malley and the Digital Research Officer Matthew J. Westerby. *HEALD* digital repository is based on the publication by Therese O'Malley (2010).

[4] A full description of this upgrade is available on the *HEALD* website.

[5] According to one's familiarity with MediaWiki, it might be necessary to consult with a software developer in order to use, install, update an extension.

[6] An *inscribed* image incorporates the word; An *associated* image is related to the term less directly, by a contemporaneous description of the feature; *attributed* images, are those for which there are no *inscribed* terms or *associated* texts.

time[7]. A person (under the category *People*) is featured for using a keyword in writing or for their relevance to the overall topic of the project. A location (under the category *Places*) is featured in reference to a person or to a keyword (for instance, *The National Monument*). *Keywords*, *Places*, and *People* are interconnected throughout the repository not only via descriptions, but also via internal hyperlinks, an indexical way to establish connections among items included in a MediaWiki page. This feature is native to the software markup language (MediaWiki 2024b). Although the content in *HEALD* is organized so to prioritize *Keywords*, the written texts intertwine and are in conversation with images of paintings, drawings, architectural plans, ceramics, photographs, and more.

Regarding the semantic values added to *HEALD* following the upgrade, standard vocabularies (Getty AAT, TGN, ULAN[8]; Library of Congress (LOC) Name Authority) were used, when applicable, to label people's and locations' name, dates, coordinates, etc. Other novel attributes interlace an image to a person (through the value *[has person]*) or to a location (through the value *[has place]*) or both. Inserting values within square brackets is also a native aspect to the WikiMedia markup language. In order to record whether a keyword is *inscribed*, *associated*, or *attributed* to an image, such detail was added as a semantic value, which is exportable (see RDF[9] string below). Both standard and customized semantics are applied with the MediaWiki extension Page Form[10]. Last, cited publications are gathered in a dedicated Zotero library (Zotero 2021). When applicable, a Zotero ID appears in the image page so to allow a direct link from a visual source to a publication[11]. The layering of attributes makes the content accessible by multiple points: via its descriptive texts; via the image collection; via the relationship between images and *keywords*, *places*, or *people*; via its extended bibliography.

As mentioned, MediaWiki is set to interact with new software thanks to a community of worldwide developers invested in the tenet of open access. In line with this principle, and with a recent trend in museum openness, the customized code used for *HEALD* is available on GitHub (GitHub 2021). MediaWiki, as utilized by *HEALD*, integrates a clean interface with SQL, a widely used database language. All these characteristics make *HEALD* a digital product easy to maintain, to implement, and to possibly migrate. The semantic web is used to turn data into information and to preserve content

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[7] At the time of writing, there are approximately more than 220 content pages.

[8] Getty Art and Architecture Thesaurus, Thesaurus of Geographic Names, Union List of Artist Names.

[9] Resource Description Framework.

[10] Page Forms has been developed by Wikiworks.

[11] See "HEALD: Anonymous, Two Ornamental Ice Houses Above Ground, 1846" (HEALD n.d.a).

since the descriptive metadata can be exported in RDF and retrieved. The use of standardized vocabularies (AAT, TGN, ULAN, LOC) makes possible to interlace the history of places and people as uniquely featured in *HEALD* with potentially other datasets that use the same sets of attributes. Nonetheless, the standardization posed a limit to the relationships expressed within the project, in particular as it relates to keywords and images. This limit was overcome by adding a string of property to be exportable as RDF:

<property:**Keyword** *rdf:resource*="http://heald.nga.gov/mediawiki/index.php/Special:URIResolver/Icehouse"/>
<property:**Keyword_relationship** *rdf:datatype*="http://www.w3.org/2001/XMLSchema#string">Inscribed</property:Keyword_relationship>[12]

Even though the two strings are unique to *HEALD*, they exist within a set of parameters (in this case, *rdf:resource* and *rdf:datatype*) that makes them recognizable and reusable. In this case, in particular, the goal is to preserve the relationship between the image and the keyword (*inscribed*) and to make this information retrievable. To extend upon this example, a more articulated section of the RDF export shows how information pertaining to the aforementioned relationships, object details, as well as bibliographic references intertwine:

<swivt:masterPage
rdf:resource="http://heald.nga.gov/mediawiki/index.php/Special:URIResolver/**File-3A0999.jpg**"/>
<swivt:wikiNamespace rdf:datatype="http://www.w3.org/2001/XMLSchema#integer">6</swivt:wikiNamespace>
<property:Keyword rdf:resource="http://heald.nga.gov/mediawiki/index.php/Special:URIResolver/**Picturesque**"/>
<property:Keyword rdf:resource="http://heald.nga.gov/mediawiki/index.php/Special:URIResolver/**Icehouse**"/>
<property:Keyword_relationship rdf:datatype="http://www.w3.org/2001/XMLSchema#string">**Inscribed**</property:Keyword_relationship>
<property:Keyword_relationship rdf:datatype="http://www.w3.org/2001/XMLSchema#string">**Associated**</property:Keyword_relationship>

File-3A0999.jpg is the object name; "Picturesque" is the term *associated* with the architectural style depicted; "Icehouse" is the *inscribed* term con-

[12] This string is taken from the RDF export of an image in the *HEALD* online repository: *File-3A0999.jpg*.

tained in the historic publication. Then, a second part of the same extract contains information about the publication:

<swivt:Subject
rdf:about="http://heald.nga.gov/mediawiki/index.php/Special:URIResolver/**File-3A0999.jpg-23Publication**">
<property:Date rdf:datatype="http://www.w3.org/2001/XMLSchema#gYearMonth">1846-12</property:Date>
<property:Date-23aux rdf:datatype="http://www.w3.org/2001/XMLSchema#double">2395631.5</property:Date-23aux>
</swivt:Subject>
<owl:DatatypeProperty rdf:about="http://heald.nga.gov/mediawiki/index.php/Special:URIResolver/**Property-3AReference_ID**"/>

The RDF above has been edited to reflect only the file name and the publication date (File-3A0999.jpg-23Publication), along with the publication ID (Property-3AReference_ID), which refers to its record in Zotero.

One of the main concerns of implementing *HEALD* semantically, was to avoid divesting *HEALD* content of its context, both digital (the current platform used) and historical (the elements described in the essays that explain *keywords*, *people*, and *places*). It is clear that a process of reduction must occur in order to create the strings of code necessary to capture the relationship between these elements. Adding semantic values to textual descriptions implied a reduction of the content to essential details, such as relationship, which are expressed with the value *Keyword_relationship*. The semantic value has been utilized as additional content to be read, analyzed, and considered in conjunction with existing descriptions, and with the art historical research at the core of the project. In other words, semantic values were taken and used for what they could offer, i.e., retrievable and archivable data, and were elaborated through the lens of the art historical research central to the project.

This way of recording content cannot be considered as a way of preserving in its true sense, for it will not recreate the digital environment in which the data was originally featured. However, it allows for both data and metadata to be reloaded in a new digital environment, in order to be further utilized for data visualizations or data analysis or else. By populating the semantic data with additional information that speaks to the context within which the history of American landscape design unfolds, users can export content for further research or adopt or expand on the customized relational model for their digital art history research projects. Along with data enrichment based on the semantic web, the project will maintain fundamental aspects of *HEALD*'s digital functionalities. The most relevant outcome pertaining to this analysis is then to consider the semantics as additional values and not as a reduction of content and context.

Based on this project, I continue to delve into aspects of digital obsolescence and digital curation by moving onto my second case study.

3. EduEDA, The Educational Encyclopedia of Digital Arts

In 2004, Tommaso Tozzi, a Florence-based net artist and activist, initiated an online project called WikiARTpedia that received an Honorary Mention at the Ars Electronica Festival of Linz, Austria in 2009 (Ars Electronica 2022). In 2012, WikiARTpedia became *EduEDA, The Educational Encyclopedia of Digital Arts*: an open research platform for networks about information technology culture. The main goal of *EduEDA*, as expressed on its website, is «to create a national and international network of people and institutions in order to collectively promote and disseminate digital arts» (EduEDA 2022). *EduEDA* is a collective effort with numerous media partners and supported by both the Academy of Fine Art of Carrara and of Florence, among other institutions. The platform is an incredibly vast repository of network art and art practices that use information technology, and it includes instances of precursors to such practices, such as conceptual art and Fluxus. *EduEDA* also includes artistic experiences and practices that remained marginalized in the overall art historical narratives of digital art. Unfortunately, among these artistic experiences, those pertaining to the Italian context, continue to be underrepresented in the global histories of digital art[13]. The recently launched *Net Art Anthology* by Rhizome at the New Museum has almost entirely bypassed the experience of Italian Net Art, with the exception of *Life Sharing* (2000-2003) by Eva and Franco Mattes, aka 01.ORG (Net Art Anthology 2017).

EduEDA, which like *HEALD,* runs on MediaWiki, only partially includes image files and – for the most part – compiles links to artists' or institutions' websites. It resembles Wikipedia in the way it is organized, with a menu that includes items such as *artists*, *artworks*, *genres* or *artistic movements*, *cross search*, *space*, *time*, *macro categories*, and related descriptive pages. Equally to *HEALD*, *EduEDA* is a collection of works that often reside in other locations, at times preserved by different institutions, online or offline, and it features internal hyperlinks. As mentioned, this is a core characteristic of MediaWiki markup language, made possible by inserting the name of a page in the back-end editor within double square brackets, as in the example that follows: *[[name of the page]]* (MediaWiki 2024d).

In order to maintain the collective character of *EduEDA*, Tommaso Tozzi adopted an open source software that allows everyone to contribute. However,

[13] For instance, the BBS called *The Thing*, founded by Wolfgang Sthaele around the same time than Tozzi made *Hacker Art BBS* is often cited as part of the history of Net Art along with the netstrikes conducted by Ricardo Dominguez since 1998; while *Hacker Art BBS* is absent from art historical accounts on the subject.

unlike *HEALD*, *EduEDA* does not use Semantic MediaWiki (SMW). Let's consider whether the project could benefit from semantic values and how. On *EduEDA*, the works are listed in alphabetical order (which is a default setting of MediaWiki that creates page lists by using a label called *Category*). As noted, the platform does not use standard vocabularies, which means that it is not currently possible to interlace, compare or contrast its content with similar information available online, and it is not possible to export any of it via RDF or to share it through Linked Open Data.

EduEDA features a *crossed search* section that allows users to find elements in the repository that are intertwined. If one clicks on the *crossed search* tab, they are taken to a page where it is possible to launch queries into a database in which information is organized into categories: dates, locations, topics, publications, and so forth. This section of *EduEDA* has been implemented via Prototype, whose last version was released in 2015 (Prototype 2015). This is a significant tool within *EduEDA,* especially since search capabilities are often problematic, given the complexity of data relationships and interconnections among this kind of objects. The categories are ordered in a JSON file and are retrievable. However, in order to be found, they require a less intuitive path than an RDF export, as offered by SMW. Here below is an extract from a JSON file pertaining to the *crossed search* within the category *Net Art* (EduEDA n.d.a):

```
if(cat == "arte_delle_reti"){
elementi = ["Arte digitale", "Arte elettronica", "Arte in rete", "Arte telematica", "Ascii art", "Browser art", "Software art", "Web art", "Conservazione dell'arte digitale", "Cracker art", "Cyberfemminismo", "Database art", "Flood net", "Form art", "Game art", "Hacker art"];
```

Two important observations can be drawn from analyzing this portion of the JSON file. First, this categorization shows that extensive manual labor would be necessary to potentially retrieve this content for preservation purposes or to utilize it on a different platform. Second, from a strictly digital art historical standpoint, this categorization reveals the difficulty of classification. It is compelling to see that, in order to strategically include as many categories as possible under the label of Net Art, a macro-label was created and then subdivided into "elementi" (elements). Unfortunately, the *crossed search* section of *EduEDA* does not seem to have been created for purposes other than browsing its content online, and does not offer other insights into the digital methodological approach to information visualization. This section of *EduEDA* therefore allows for exploration of how its content interlaces, but it does not currently enable exploration of those relationships computationally.

A series of changes could be applied to the current structure of *EduEDA* or similar repositories. Whether or not these changes take place, they could

be helpful in suggesting a roadmap for digital repositories that can be used for several inter-sectorial purposes within disciplines that share a common digital ground of investigation. In addition, since MediaWiki is already set up for the semantic web, it might be possible to upgrade *EduEDA* without necessarily rebuilding it. I believe it is necessary for a current version of *EduEDA* to be kept as an additional tile in the technological history of network culture. As noted by Christiane Paul, «writing an history of new media and preserving the art itself will require new models and criteria for documenting and preserving process and instability» (Paul 2008, 6). The scenario of new media art is fragmented and these new models and criteria seem to be inevitably unstable, transitory, and multifarious. In order to formulate a proposal to use the material made available by Tozzi for research and exhibition purposes, I take into consideration two factors: first, such a material can be divided into *reproduced* and *duplicable* following the model laid out by Ippolito (2008). With regard to the artistic practices similar to Tozzi's, *reproduced* work consists of digitized tapes of live performances, happenings, or events that were transferred to a digital format. In contrast, *duplicable* work consists of those projects that were born digital. Additionally, an element of the work is unreproducible, namely the context in which these artistic experiences took place, specifically those produced during the two decades prior to the 2000s.

That being said, the areas to edit or enhance would be the following:

1. Description of the work (adopting standard vocabularies);
2. Format of the available files;
3. Search feature and tagging (adding metadata; using Semantic MediaWiki);
4. Usability of the content (RDF, CSV, XML exports).

A platform including more uniform descriptions, with details on file formats, duration of the work, code structure, and enriched metadata, should also enable the use of its content by exhibition makers. I will not go into details regarding points 1 to 3, which are rather self-explanatory. Rather, in order to further investigate digital curatorship, I will focus on point *4: Usability of the content*.

This feature can be particularly useful for exhibition purposes. While putting together a new media art exhibition, it should be possible to borrow extant projects from an online repository with proper acknowledgement of all the stakeholders involved. Enhancing this feature could lead to the creation of a shared new media art platform from which any institution could borrow the work (by downloading it or by presenting it in a browser) for the duration of an exhibition. Such a platform would then serve the much larger goal of preserving, presenting, and researching new media art experiences as occurred

prior to the 2000s. The latter is historically illustrated in *EduEDA* by descriptive pages whose content is not marked semantically.

This way, *EduEDA* will have more than just links to existing resources, as it will include the work, or a simulation of it, in whichever available format. It will still serve as the aggregator it is now – extensive and complex – and it will build on its already well-established practice of working collaboratively with multiple institutions. Another difference between this platform and existing ones will be the inclusion of the neglected history of Italian new media art. To serve this purpose, the platform should, however, be available in multiple languages (EduEDA n.d.b)[14].

Similarly to *HEALD*, the repository could have a point of entry to its content through image files rather than exclusively via text. *HEALD* image collection allows users to start exploring its vast content by directly clicking on one of the images contained in the collection (HEALD n.d.b). Images reveal their relationship to other elements of the projects through icons, and through a system of filters that guides user's exploration. Last, I contend that what was once considered the disturbing office-like aspect of early new media art exhibitions, will no longer concern exhibition makers nor viewers (Federici 2019). It is plausible to consider that, for the most part, viewers are now familiar with information technology, and will be more inclined to explore simulations of early new media artwork. The technological and temporal distance between current devices and those employed prior to the 2000s may facilitate an exploration of the latter in a gallery or museum setting due to the visual cues that would allow the viewer to see the old devices as ancestors of more recent apparatuses.

By combining knowledge, methods, and tools already available across disciplines and projects that deal with the digital realm, the investigation of digital objects can be further enhanced. All these disciplines already share the same computational and datafied language. The purpose of this exploration is to find a common ground from which they can all benefit. I will summarize a possible common path able to serve projects as diverse as *HEALD* and *EduEDA* in the conclusions.

4. Conclusions

This article focused on the open access software MediaWiki, utilized by both *HEALD* and *EduEDA*, which «is used by tens of thousands of websites and thousands of companies and organizations. [MediaWiki is] powerful, multilingual, free and open, extensible, customizable, reliable, and free of charge» (MediaWiki 2023a). Nonetheless, it is not intuitive and arguably it is

[14] At the time of writing, only 99 items in *EduEDA* have been translated into English.

not user friendly. However, the general consensus is that MediaWiki is a *good* software insofar as it is free and open, well maintained, and widely used. It is designed to allow users to edit, update, and delete content[15]. All textual content of MediaWiki.org is licensed under the Creative Commons Attribution/Share-Alike License (CC BY-SA) and the GNU Free Documentation License (GFDL) – software can be copied and modified – except for pages that explicitly state that their contents are in the public domain (MediaWiki 2023b). A Creative Commons license entails that the software can be shared – copied and redistributed in any medium or format – and adapted – remixed, transformed, and built upon (Creative Commons n.d.).

Although it was never conceived as a digital art history tool, MediaWiki embeds significant components and possibilities that can serve the discipline well. One of these components is Semantic MediaWiki; while its extensions can make the software quite versatile since their development is ongoing and responds to an ever-changing digital environment. One example is the latest implementation of an extension that works with IIIF (International Image Interoperability Framework), a tool widely used in image-based research (MediaWiki 2024c). The combined analysis of projects as diverse as *HEALD* and *EduEDA* demonstrates how adaptable MediaWiki can be and how it can support a digital art historical investigation, since it allows for the handling of complex object relationships between textual and visual content.

MediaWiki records a project's development by retaining the history of how and when each page of a digital repository is edited. This functionality can be significantly helpful. Process history is generally accepted, or even in demand, in database-driven tools for digital asset management (particularly in museums, in order to avoid losing an object's provenance or exhibition history, for instance). Nonetheless, it is often overlooked in the field of digital humanities and digital art history, whose tools tend to replicate the transparency (obliteration) model mentioned in the introduction. This is particularly true in case of data visualizations, which are highly mediated. Along with clarifying the process through which a digital project is conceptualized, and eventually displayed, the history of process itself is a rather critical aspect to consider. For instance, it helps to track users' interventions, in particular when a large team is working on the same project over an extended period of time. In addition, it testifies to the various steps, successes, and pitfalls that might characterize the creation of large repositories, and perhaps it may lead to a specific change of direction or compromise.

The overall goal is not to present MediaWiki as a panacea for the many aspects discussed throughout this article that pertain to the larger field of digital art history and are highlighted in the cited literature, but rather to contem-

[15] This functionality can be turned off, and in general users' accessibility and editing capabilities can be diversified.

plate the complexity of MediaWiki as an advantage. Given the structure and potential of the software, one wonders whether it can be used to combine those aspects. Complexity and contextualization are necessary to unravel research in the humanities. Along with standard ontologies, MediaWiki allows for the use of additional unscripted semantic categories. As a result, the digital repositories analyzed here are an example of how to integrate elements of computing with the multifarious landscape of research in the humanities – not necessarily innovatively, but coordinately.

Another goal of this investigation has been to reflect on how data is turned into information by looking at the interstices of this transformation rather than taking it for granted. Accordingly, I explored possible ways to intervene on how digital content is made and displayed. As a critical reflection on the term *datafication* and the implications of using the semantic web and web ontologies in digital art history, this article investigated the affordance given to data, in general, and its impact on the humanities, in particular. In addition, it touched upon aspects of digital curatorship and preservation, encouraging an active use of existing digital tools and practices with the intent to shape the digital realm through humanistic methodologies and approaches, rather than yielding to computing unconditionally. The turning of data into information, which is one of the main conundrums for humanists dealing with computational methods, can be done by shifting attention to the process, by highlighting and discussing the choices made, and most importantly, by engaging with the complexity of both computing and humanistic research. This approach, which is not novel, is not dismissive of quantitative research, but it does not prioritize it. Rather, it considers its potential – such as the exportability of data – without denying its limits.

By analyzing the recent upgrade to *HEALD* (HEALD 2021b), I highlighted that web vocabularies are only one way to express meaning and do not necessarily entail one way of interpreting it. Although the semantic web now allows for *HEALD*'s online content to be retrieved, exported, migrated, and further analyzed, it will not prevent the loss of the original digital environment in which the project took form. This aspect speaks to digital preservation as well as to digital curatorship. The latter, in particular, is another element that tends to go unnoticed, even though digital projects are always delivered via a web-based interface or a website available to the public, and they are often developed with an ideal user and/or a specific mode of navigation in mind. The fact that users browse platforms differently and have varying needs in terms of inclusivity and accessibility – which is a fundamental aspect that interests digital curatorship greatly – is not always considered in database-driven tools. As highlighted in the discussion on the *HEALD* upgrade and further suggested by the investigation of *EduEDA*, allowing users to enter or explore content

from multiple points of access can unleash research potential, enhance content exploration, and improve navigation experience.

It should also be noted that, for the most part, the case studies presented here pertain to archives of reproductions. That means that much of the work on display underwent a process of digitization. While all image files in *HEALD* pertained to digitized objects, the work featured in *EduEDA* is either digital or digitized. In the case of *EduEDA*, digitization was used as needed in order to align the work under the same computational language. This includes, for instance, early performance work, and other artistic interventions that were recorded on tape and then digitized, as well as works that used to run on or were made with software that is no longer available. These works can re-live as a simulation by using a software that acts like the *old* version of the one originally used. Other have explored this path. For instance, the project ArtBase by Rhizome offers emulations of "expired" software to reproduce an artwork on a current framework (Rhizome 2021)[16]. The question yet to be answered is not whether good tools for digital art history exist, rather whether we can create models, structures, and roadmaps to avoid redundancy while embracing interdisciplinary methods.

Therefore, I have juxtaposed aspects of seemingly distinct disciplines – namely digital art history, digitized art history, digital curatorship, and digital preservation – in order to glean insights that these fields can share as we navigate the digital realm. *HEALD* and *EduEDA* shed light on, and eventually helped to come to terms with, relevant aspects of the digital that pertain to both digital-born and non-digital-born artefacts, namely the difference between *reproduced* and *duplicable* items. This difference can be stretched further to be considered close to the distinction that Drucker (2013) draws between digitized art history and digital art history. Perhaps this distinction is more useful at a granular level of object analysis rather than at macro disciplinary level.

Since the digital realm and tools allow for information to be reproduced, duplicated, and replicated, we are no longer dealing with unique artefacts or objects, but items that are ubiquitous and whose *originality* as a concept and methodological approach has run into the sand. This is not to say that a clear distinction should not exist. The information pertaining to the origin of content is still precious and should be included within the metadata as well as indicated by labels. At the same time, specific scholarly competencies within the different fields should be regarded. However, once the object enters the digital sphere, it becomes ubiquitous, reproducible, and transferable, and our approach to it should embrace these inherent aspects. For this reason, and because of the ways in which the digital realm has changed the work that humanists do and how it is done, aspects of digital curatorship, digital conservation,

[16] Rhizome has recently relaunched their project ArtBase in an attempt to continue preserving digital born artefacts.

and digitized art history could exist under the umbrella of digital art history, adopting those distinctions as they pertain to the object at a micro level. These disciplines all operate on and with overlapping methodologies, and could all benefit from a crosspollination rather than compartmentalization.

Finally, by highlighting *HEALD* upgrade and suggesting similar interventions for *EduEDA*, I hope to have demonstrated how to practically move step by step toward an extended and extensive, yet obviously not comprehensive digital art history, characterized by *datafication*. The first step of this analysis illustrated the use of freely available software (MediaWiki), particularly for its ability to record process-oriented projects. Second, I showed how the relationships characterizing the material (*reproduced* or *duplicable*) have been conceptualized, defined, and described (semantic web). By doing so, I observed how information has been reduced to fit the process of *datafication*; Third, I considered how to best represent these relationships for preservation purposes (RDF export). Fourth, I addressed user interaction and project accessibility (points of access); Fifth, I also considered the opportunity to share data via existing open data initiatives (Linked Open Data; GitHub). Last, I discussed the possibility of customizing the software to adapt its functionality to the content under investigation (extensions). This path can offer different layers of content fruition and different layers of object analysis. It can help maintain a clear focus on how to approach the *digital* to serve different objectives and incentivize the creation of additional shared models (similarly to the shared vocabularies) for others to adopt.

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