Usability Evaluation of Street Art Websites*

Sokak Sanatı Web Sitelerinin Kullanılabilirlik Değerlendirmesi

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Abstract

This study aims to evaluate street art websites in terms of usability. In the first stage, 31 websites were selected from among 700 graffiti websites listed under the "best list" title of ArtCrimes and through searches using relevant keywords. The usability evaluation was conducted based on predefined criteria derived from the Dyson and Moran usability scale, and the website with the highest usability score was further analyzed in detail using the heuristic evaluation method by subject matter experts. The findings indicate that the evaluated websites lack institutional information and policies regarding reproduction and copyright and provide limited descriptive data about the artworks. The analysis revealed that the platform with the highest score is strong in terms of aesthetic and minimalist design, consistency, and standards but weak in user control and freedom as well as flexibility and efficiency features. This study highlights the importance of usable websites for access to street art and aims to contribute to future research in this field.

Öz

Bu çalışmanın amacı, sokak sanatı web sitelerinin kullanılabilirlik açısından değerlendirilmesidir. İlk aşamada incelenen 31 web sitesi, ArtCrimes'in "en iyi liste" başlığı altındaki 700 graffiti web sitesi arasından ve ilgili anahtar kelimeler kullanılarak yapılan aramalar sonucunda seçilmiştir. Kullanılabilirlik değerlendirmesi, Dyson ve Moran kullanılabilirlik ölçeğinden türetilen önceden belirlenmiş kriterler doğrultusunda gerçekleştirilmiş, ardından en yüksek kullanılabilirlik puanına sahip web sitesi konu uzmanları tarafından sezgisel değerlendirme (heuristic evaluation) yöntemiyle detaylı bir şekilde analiz edilmiştir. Bulgular, incelenen web sitelerinin eserlerin yeniden üretimi ve telif hakkı ile ilgili kurumsal bilgi ve politikalar açısından yetersiz olduğunu, ayrıca sanat eserleri hakkında sınırlı düzeyde tanımlayıcı veri sunduğunu göstermektedir. İnceleme sonucunda, en yüksek puana sahip platformun estetik ve minimalist tasarım, tutarlılık ve standartlar açısından güçlü olduğu; ancak kullanıcı kontrolü ve özgürlüğü, esneklik ve verimlilik özellikleri açısından zayıf kaldığı belirlenmiştir. Bu çalışma, sokak sanatına erişimde kullanılabilir web sitelerinin önemini vurgulamakta ve bu alanda yapılacak çalışmalara katkı sağlamayı amaçlamaktadır.

1. Introduction

Street art sometimes deals with factors such as beliefs and traditions that are part of the common culture and sometimes with rebellions due to various situations. Thus, it is important from a historical, cultural, and sociological perspective as it reflects the social trends of the period in which it was created. On the other hand, street art is included in the definition of cultural heritage as part of tangible cultural heritage (Poon, 2016) or as part of intangible cultural heritage (Isaac, 2017) and is sometimes included in both

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forms (MacDowall, 2006; Merrill, 2015). Dissecting these definitions, Nomeikaite (2017) considered heritage within the scope of "experience" and evaluated street art as an independent heritage product apart from its tangible or intangible aspects.

Physical damage due to the environmental conditions or painting by property owners or local governments causes the street art to be destroyed or short-lived. Therefore, it is tough to physically preserve these works and make them accessible for a long time. While the work of Da Vinci, Mona Lisa has been preserved since the 16th century, the murals painted in Maros-Pangkep at least 40.000 years ago are waiting to be included in the UNESCO World Heritage List (Brumm et al., 2021). On the other hand, the work of graffiti artist "İzinsiz" is deleted after approximately 25-30 minutes (+90, 2020). While a mural that can be discovered due to long and costly excavations is very important for archaeologists, the street art that we see today disappears before it can be recorded. In addition to its aesthetic value, street art has the potential to be a reliable historical source because it can exist without being under the control of authority and without being censored. During the Gezi Park protests in Türkiye, protesters used the city walls to show their growing discontent and proclaim the urban landscape as a monument to participatory democracy (Tulke, 2020, p. 122). A similar phenomenon occurred during the Black Lives Matter movement, which gained momentum following George Floyd's murder due to police brutality. Today, it is not possible to see these artifacts physically, which are the notes on the walls of history, on those streets today. Some of these works may still be found digitally, though in an uncontrolled form across the Internet. Nevertheless, it should not be overlooked that street art can play a reliable source, especially on sensitive issues that may be subject to censorship.

Likewise, as with other forms of cultural heritage, street art can be preserved by cultural memory institutions such as libraries, museums, archives, and galleries. However, these institutions often face constraints related to budget, workforce, time, and policy, and street art frequently falls outside the scope of their traditional content. Moreover, it is particularly challenging for these institutions to effectively detect and document street art, as it often emerges spontaneously in urban spaces and can disappear within days or even hours. As Cowick (2015, p. 42) points out, it is necessary to involve society in the documentation of street art through crowdsourcing methods. Participatory heritage, defined as "a space where individuals can engage in cultural activities outside of official institutions to share knowledge and recreate it together with others" (Roued-Cunliffe and Copeland, 2017, p. xv), is exactly the approach required for the sustainability of street art. With the crowdsourcing method (Carletti 2016, p. 197), which is the most common participatory heritage approach, society can contribute to the management of cultural heritage in various ways such as editing and transcription of works, contextualization, completing the collection (by adding works), classification, co-curation, crowdfunding (Oomen and Aroyo, 2011, p. 140). Crowdsourcing methods are needed in the management of street art, which is a cultural heritage product, since "heritage institutions that are managed by policies and procedures and have legal and economic restrictions" (Roued-Cunliffe and Copeland, 2017, p. xv).

2. Literature Review

Street art is defined in the Lexico (2023) dictionary as "artwork created in the public domain, often without official permission". However, in general, the terms "graffiti and public art" are used together with street art, and these concepts are sometimes confused with each other. Graf (2018, p. 8) said that graffiti started in the 1960s in Philadelphia and then in New York, when young people wrote their nicknames on the walls of the city due to youth unemployment. Wacławek (2011, p. 12) stated that graffiti writers aim to increase their recognition in the "graffiti scene". The first form of graffiti, which is the signature of the person who wrote it, made quickly, consisting of only simple characters and a single color, "tag" evolved into "throwie" or "throw up" in the 70s (Wacławek, 2011, p. 16). In this new form, graffiti increased in size and graffiti acquired color, shadow and style features. Between 1978 and 1981, a new form called "piece" developed in New York. While the previous two forms were seen as "nuisance" by the public, the new form was more impressive to the public (Wacławek, 2011, p. 18). Producing works in this form takes more time and requires technical expertise. The works are much more colorful and larger, and sometimes they have begun to carry meanings such as conveying a message. Although the focus is still on names and letters, art and design features have started to come to the fore. In addition to the texts, drawings, called "characters", in which characters and creatures are interpreted, have also been used. During 1980s-1990s, graffiti styles increased exponentially thanks to

international travel, magazines, exhibitions, graffiti trains, hip hop culture and the internet. Graffiti, which has been pushed to its limits in terms of technique and aesthetics worldwide, had to coexist with other public art forms. Works after this stage are called post-graffiti, neo-graffiti or simply street art (Wacławek, 2011, p. 28). Since street art is made in the public sphere, another type of art it resembles is public art. In her study, Cowick (2015, p. 30) showed the difference between the three terms by stating that graffiti and street art are illegal; public art is legal, but street art and public art have the purpose of giving a message to the public, while graffiti does not have a message purpose or contains messages within the gang. While Daicendt (2013, p. 8) distinguishes between street art and graffiti, he indicates that street art deals less with letters and is made with different materials other than spray. In Graf's study (as cited in MacDowall, 2015), it was demonstrated that graffiti can be considered as a subgenre of street art or as a separate genre.

Some studies associate street art with cultural heritage (Bates, 2014; Nomeikaite, 2017), highlight its aesthetic features (Nogel, 2015), review the effect of publicity on the number of spectators in art organizations (Poole, 2020), focus on its relationship with political movements (Taş and Taş, 2015, Cowick, 2016, Tulke, 2020), discuss the copyrights of street artworks, (Davies, 2012; Bonadio, 2017) and critique the public's view of street art (Conklin, 2012; Vanderveen and van Eijk, 2016) in the literature. In addition to these, various studies have been carried out on the documentation of street art. Novak (2014) emphasized that dimensional information is not considered important in the documentation of street art. The author also touched upon the characteristics of 4 street art forms classified as “piece”, “character”, “tag” and “throw up” and determined their average dimensions (width and height) on 268 works. Gottlieb (2008) and Novak (2015) focused on the classification of street art in their work. In another study, Novak (2015) highlighted the importance of photography in documenting street art and provided a guide for photographing and identifying photographed works. Photography is one of the most important steps in documenting street art, which can be considered as a visual art. Supporting this, Blanché (2018) pointed to the different relations of photography with street art. The author classified street art photos in four different ways:

(1) Photography as an initial source of inspiration for street artists,

(2) Documentary photograph taken by the artist, fans, researchers, police or landlords,

(3) A photograph documenting the stages of work or the deterioration in work,

(4) Street art photography, which emerges with the interpretation of street art and each of which can be considered as a work of art separate from street art.

Due to the ephemeral nature of street art, it will be difficult to preserve the physical work, so the preservation must be done in the digital environment. In his study, Noyes (2015) reviewed the interaction of art history objects with digital technologies. Noyes (2015) focused on documenting street art, which is an ephemeral product, using Palladio, Neatline and Unity three-dimensional technologies. Iglesia (2015) mentioned the inadequacy of research on the documentation of street art and suggested a model for the documentation of graffiti works in the form of “stencil”. He documented the works in the form of a “template” (stencil) in the Freiburg region of Germany, together with metadata fields defined as location, physical dimensions, the date the photo was taken, the date of disappearance (if necessary) and the related works (if they came out of the same mold) and made it available on the web. Lederman and Jindani (2016) similarly designed a digital archive prototype consisting of a website and mobile application for the preservation of street art. In this framework, they created their work by curating of collections. In another study (Graf 2018) on the documentation of street art on online platforms, the open coding method was used to determine the organizational tags used in 241 different sites and the architectural features of the websites. In the study, facets related to the website were determined under two code categories named “general features” and “other media”. It was seen that there were different ideas about terminology or categories that should be used to organize the photography collections as a result of the study.

Although there are various studies on the documentation of street art in the literature, apart from Graf's (2018) research, there is no study evaluating the websites that open access to street art. In the literature, it is possible to come across studies (Olsina Santos, 1999; Signore, 2005; Fotakis and Economides, 2008; Kabbasi, 2017) that use different methods and scales to evaluate the websites of museums that have

similar characteristics with websites containing street art collections. In another study (Dyson and Moran, 2000), the general features, usability and presentations of seven different museum websites were evaluated. The one of the most important feature that distinguishes the model used in this study from others is the use of formal and informal (heuristic) examination methods. In the study of Dyson and Moran (2000), the usability criterion was adapted from the evaluation criteria used by Garzotto, Matera and Paolini (1998). It is based on the principles of usability, learnability and efficiency. Learnability was measured by the criteria of consistency and predictability, while productivity was measured by the criteria of accessibility and orientation. The presentation features of the site, consistency, typography, images and text were evaluated within the scope of general criteria.

3. Methodology

There are many studies in the literature (Dyson and Moran, 2000; Olsina Santos, 1999; Signore, 2005; Fotakis and Economides, 2008; Kabbasi 2017) that use different methods and scales to evaluate museums' websites. However, apart from Graf's (2018) research, we do not face any study that evaluates websites that provide access to street art. This study aims to contribute to the literature by evaluating the usability of street art websites. The questions to be answered within the scope of the research are as follows:

- Which characteristics do street art websites have as suggested in Dyson and Moran's model?
- Which crowdsourcing methods do users contribute to the management of street art on street art websites?
- What are the strengths of the leading street art website in terms of usability?

This study consists of two consecutive stages: In the formal evaluation stage, the general characteristics of all street art websites were evaluated in line with the formal part of the model developed by Dyson and Moran (2000). This review was carried out under headings such as institutional information, finding aids, user information, collections, structural context, search mechanisms and call returns and records. Crowdsourcing methods used on websites were evaluated in line with the crowdsourcing types classified in the model developed by Oomen and Aroyo (2011). The websites evaluated were selected among 700 graffiti sites in ArtCrimes' "best list".

In the second stage, the street art website with the highest usability score was evaluated as heuristic by usability experts. Heuristic evaluation is "a method of finding usability flaws in a design by evaluating them within the framework of principles known to facilitate the use of user interfaces" (Nn Group, 2019). The heuristic evaluation of the Street Art Cities website, which received the highest usability score, was conducted by 5 experts from the Hacettepe University Computer and Instructional Technologies Education Department between 06–28 January 2023, with ethics approval obtained from the Ethics Committee of Hacettepe University Senate. The heuristic evaluation survey was developed by Tehrani, Zainuddin and Takavar (2014) based on Jakob Nielsen's 10 basic usability principles. Under each basic usability principle in the survey, there are various propositions related to that principle. Experts were asked to answer "yes", "no" or "undecided" to indicate whether these propositions were present on the site they reviewed. In addition, at the end of the survey, they were asked to directly state their general opinions about the websites, and their shortcomings or errors. Experts' "Yes" answers were evaluated as 1 point, "No" answers as 0 points, and "Undecided answers" as 0.5 points. The score of each usability criterion was calculated by the sum of the scores of the propositions it contained. While interpreting the results, the total scores received by the participants were proportioned to the maximum value they could get, and the success levels of the criteria were comparable to other criteria. To make the success level of these two criteria, which are evaluated with different numbers of propositions, comparable to each other, the formula "(100/Maximum Value) X Received Value" has been applied to each proposition.

3.1. Data Collection

Research data related to street art websites were collected between 01-10 September 2021. The first update check of the sites was carried out between 01-07 March 2022, and the second check was carried out between 01-07 November 2022. In the second control, it was seen that 2 sites whose data were recorded before were broken, but they were not excluded from the scope of the research because their

data was recorded before. After all the websites were determined, the evaluation phase was started. In the formal stage of the evaluation, the Dyson and Moran (2000) model was used to determine the general and collection-based usability features of the websites, and the criteria specified in the Oomen and Aroyo (2011) model to determine the crowdsourcing methods used.

The values were calculated by assigning 1 or 0 points based on the presence or absence of features to determine the most successful website according to both models. In Dyson and Moran's (2000) usability survey, "type" and "list classification" under the collection title, "position within the site" under the structural context, "interface type" under the search mechanism, search return, and "records" under the title. The answers sought in the criteria of "quality" are not related to whether the site has that feature or not. Instead, in the criteria of "type", "list classification" and "interface type", the answers were scored according to species diversity. For example, for "list classification", the website that gives results in terms of artist, location, and likes gets 3 points, while the site that classifies only by artist gets 1 point. While evaluating the "position within the site", the site whose collection was reached with the least number of clicks received the highest score, and the site with the most clicks received the lowest score. In the "quality" criterion, in which picture resolution values are measured, the highest score among 7 groups was evaluated with 6 points and the lowest with 0 points. In Oomen and Arayo's (2011) survey, such a problem was not encountered as the values can directly take 1 or 0.

3.2. Evaluation

Websites selected for evaluation at a global level were identified by scanning the Art Crimes website (https://www.graffiti.org/) and conducting a Google search using related keywords to discover street art platforms. The websites were selected from among 700 graffiti websites in the "best list" title of ArtCrimes, as Graf (2018) did in her study, between 25-30 August 2021. The study did not include 468 of the 700 sites as they were broken, relocated, or advertising websites. 122 sites were excluded because they were personal portfolios rather than street art collections created by artists for professional purposes. As the study only included websites in English, 47 websites, forums, blogs, and social media sites were excluded as they would not allow the review of a street art website only and will cause the entire site to be reviewed, which is outside the scope of the research. Since the usability of mobile applications and websites may differ due to their types (Özen Çınar, 2015, p. 1), mobile applications were also not included in the study. The remaining 17 sites were deemed suitable for analysis (see Table 1).

Table 1

Compatibility Table of Scanned Websites from Art Crimes

Status	Code	Count
Non-functioning Website	0	468
Reviewable	1	17
Subpage of another Website	2	28
Artist's Website	3	122
Created in a different language	4	47
Social media collection	5	15
Drive link	6	1
Official institution	7	1
Blog	8	1

The keywords "Street Art Website", "Graffiti Website", "Street Art Archive", "Graffiti Archive", "Street Art Collection" and "Graffiti Collection" were searched using the Google search engine to identify street art websites not indexed on the Art Crimes website but deemed important for research. The first 100 results for each keyword search were evaluated. Websites already included in Art Crimes were excluded from this review. As a result of this scan, 14 new websites were added to the list. The URLs and names of the 31 websites identified as suitable for examination are presented in Table 2 (see Table 2).

Table 2

Evaluated Websites within the Scope of Research

Source	Name	Link
Google	Global Street Art	http://globalstreetart.com/
Google	Street Art Cities	https://streetartcities.com/
Google	Fatcap	https://fatcap.com/
Google	LDN graffiti	http://ldngraffiti.co.uk/
Google	I support Street Art	https://www.isupportstreetart.com/
Google	Street Art Sheffield	https://streetartsheffield.com/
Google	Atlanta Street Art Map	https://streetartmap.org/
Google	Dunedin street art	https://dunedinstreetart.co.nz/artworks/
Google	Street art Barcelona	https://www.streetartbcn.com/
Google	Inter Graff	http://intergraff.com/
Google	Sydney graffiti archive	https://www.sydneygraffitiarchive.com.au/collection/tag/toy
Google	public art archive	https://www.publicartarchive.org/results/
Google	Tel Aviv Street Art	https://www.telavivstreetart.com/
Google	Museum of street culture	https://www.museumofstreetculture.org/street-art-collection.html
ArtCrimes	@ 149 St.	http://www.at149st.com/
ArtCrimes	50-millimeter Los Angeles	http://www.50mmlosangeles.com/
ArtCrimes	Art Crimes	https://www.graffiti.org/
ArtCrimes	Bombing Science	https://www.bombingscience.com/
ArtCrimes	Crushing Miami	https://crushingmiami.com/
ArtCrimes	Ecosystem	https://home.ekosystem.org/
ArtCrimes	The Hull Warehouses	https://www.angelfire.com/in/warehouse/
ArtCrimes	MelbourneGraffiti.com	http://www.melbournegraffiti.com/
ArtCrimes	Miami Graffiti	http://www.miamigraffiti.com/
ArtCrimes	Nashwriters	https://www.angelfire.com/art/nashwriters/
ArtCrimes	paint.dk	http://www.paint.dk/
ArtCrimes	Philly Graffiti	https://www.angelfire.com/biz2/MYZONE/new.html
ArtCrimes	Railwhores	https://railwhores.tripod.com/
ArtCrimes	Steel City	https://members.tripod.com/~Steel_City/
ArtCrimes	Subway Outlaws	http://www.subwayoutlaws.com/
ArtCrimes	Stencil Archive	https://www.stencilarchive.org/
ArtCrimes	Visual Orgasm: The Canadian Climax	http://www.visualorgasm.com

4. Findings

4.1. Formal Evaluation Findings

4.1.1. Institutional Information

There was no page named "mission" on any site instead the purpose of the site was mentioned briefly under the "about" page. "About" or the mission information on the home page of the site is available in 61% (n=19) of the sites.

Eight of the websites, that is, 26% of all websites, have a copyright policy, even if they are not directly named. In terms of street art websites, this information means who will upload the work, with what information, and by following which rules. The copying policy refers to the information explaining the conditions under which street artworks can be used in different sources. This information is seen in 12 of 31 sites, 38.8% of all sites. In this article, it is stated that the pictures and metadata of the works belong to the uploader and are licensed under CC BY-SA 4.0. With this license, it is stated that copying a work is free, provided that the creator/artist of the work is correctly cited. Most of the websites (80.64%, n=25) provided a way for the user to communicate. 13 sites (41.93%) provided only e-mail addresses, 8 sites (25.8%) provided only in-site messages or contact forms, and 4 (12.90%) provided both communication methods. Street art sites do not need a building as their works can be freely found outside. However, despite this, 3 websites (9.7%) have become institutionalized and can provide address information in a physical location.

4.1.2. Finding Aids

Under this heading, general search features on street art websites were evaluated. The evaluation was made on site-wide finding aids, not at the collection level. The only tool offered outside of the menu options are the search bars. Only 35.48% (n=11) of the sites had a search bar for general searching.

4.1.3. User Information

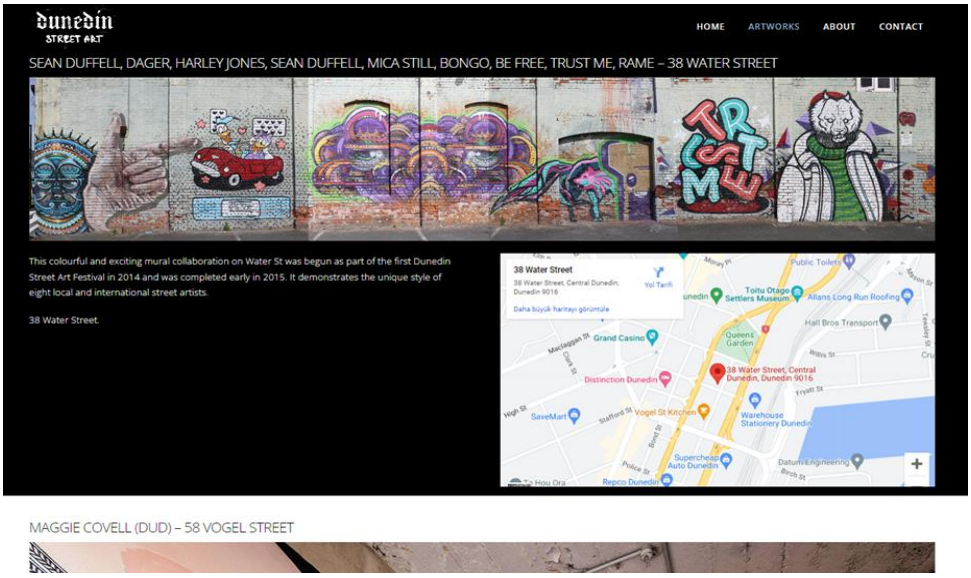
User information was measured by looking at whether websites have a target audience and whether they want feedback from the user. 64.5% (n=20) of the websites reviewed provide an opportunity for their users to return. Although this option is often provided via the contact page, 22.58% (n=7) of the sites also include statements encouraging direct returns. Only two sites (6.45%) included the type of users who were clearly addressed.

4.1.4. Collection

Access types of document were evaluated by grouping them into static lists, databases and interactive maps. 51.61% (n=16) of the collections were presented with static lists. The positions of the works listed on the same page are shown on the map (see Figure 1). Only one of the websites in this group (Dunedin Street Art) includes this feature.

Figure 1

Dunedin Street Art as an Example of a Static and Mapped Website



Source: https://dunedinstreetart.co.nz/artworks/

The remaining (48.38%, n=15) websites have databases that have a more flexible structure and allow rapid updating, and 7 of them (22.58%) also allow searching on the map. Table 3 shows according to which characteristics street artworks are classified. Street artworks were classified according to the artist's name in most of the sites (67.74%, n=21). This is followed by location (45.16%, n=14) and species (32.25%, n=10). The surface on which the work was applied was used as a classification type in 6 sites (19.35%), while the date and technique were used as a classification type in only 4 sites (12.9%). Collection, style, content, being liked, and being defined are included as classification types on only one site. A classification has been made according to the information on whether the work, which is found on only one website (Street Art Sheffield), still exists in the same place. Disappearance is a form of classification unique to street art, and in fact necessary. The artist's name was also seen as the most frequently used descriptor in Graf's (2019, p. 116) research. However, in her work, date and event are metadata fields that follow the artist's name.

Table 3

Classification Methods for Street Art

List Classification	n	%
Artist	21	67,74
Location	14	45,16
Type	10	32,26
Applied surface	6	19,35
Date	4	12,90
Technique	4	12,90
Collection	1	3,23
Likes	1	3,23
Identification Status	1	3,23
Style	1	3,23
Content	1	3,23
Disappearance of the street art	1	3,23

4.1.5. Structural Context

Collections can be accessed with one click on 45.16% (n=14) of the websites and with 2 clicks on 48.39% (n=15). On a single site (Crushing Miami) the collection is located directly on the main page and on a single site (Intergraph) it is possible to switch to the collections with 3 clicks. It was observed that 45.16% (n=14) of the websites had links to external websites. These websites linked with different links also contain street art collections. The Art Crimes website, which enables the identification of the websites in this research, has the feature of having the largest list of external collections by linking to a total of 700 external collections. It was seen that only 45.16% (n=14) of the websites had up-to-date information. Moreover, it was concluded that 2 of these websites (Sydney Graffiti Archive and Public Art Archive Tel Aviv) were not active when they were checked again on 29.10.2022.

4.1.6. Search Mechanisms

In most of the collections on the websites (n=28, 90.32%), the menus acted as the main search mechanism. Searches were made using words in 25.8% (n=8) of the sites, using maps in 19.35% (n=6) and lists in 6.45% (n=2). Only one site does not have any search mechanism. This site is Dunedin Street Art, which has a static feature again. Another criterion evaluated under the title of search mechanism is the type of user. The question of what level of users can perform searches was asked, but no particular user type was specified on any site in this criterion.

4.1.7. Search Return and Records

It has been revealed that the search bar does not work in only one of the 8 (25.8%) sites that can be searched by word. In the remaining 7 sites (22.58%), the search returns were in the form of lists with thumbnails. According to the data, in unsuccessful searches, messages appear in 4 of 7 sites showing that the searched result could not be reached, while in the other 3 pages, even a message is reached. None of these sites offer similar or alternative results to the searched work.

All of the websites contain artifacts in the photographic genre. Only 2 sites (6.45%) (Barcelona, Tel Aviv) also included videos. However, only 9.67% (n=3) of the sites included the number of works. These are Stencil Archive with 25.780 works, Street Art Cities with 36.600 works, and Global Street Art websites that claim to have more than 100.000 works. Various criteria such as noise, resolution, and compression quality can be considered when measuring photo quality (Image Resolution, 2006). Dyson and Moran (2000) measured picture quality by choosing resolution from these properties. However, without mentioning any standards in their work, they found it sufficient to describe the photographs only as “low” or “high” quality (Dyson & Moran, 2000). In this research, while examining the image resolutions on street art websites, megapixel sizes, which generally represent resolution, were taken into consideration. The problem of the street art websites, unlike institutional institutes, do not have standard-resolution photos because the digitalization process is done by a single person, or machine, or without a specific guide. On the same site, both 12.192768 MP and 0.713728 MP artifacts can be seen (e.g., Miami Graffiti). However, the resolutions of 3 randomly selected samples from each site were calculated as megapixels and averaged. Resolution classification is based on high-definition (HD) standards (Nilsson, 2015). Most websites evaluated according to the 1080x720 pixel HD standard were found to be in nHD (ninth HD, one-ninth of HD) (40%, n=12) quality. Then come the websites that are too small to be named in the high definition standard with a rate of 20% (n=6). Then, it was observed that the number of websites decreased as the quality increased, respectively, Quarter HD (qHD) (13%, n=4), HD (10%, n=3), HD+ (7%, n=2), 4K UHD (%3, n=1).

Two of the surveyed websites (7%) do not allow clicking on copyright grounds and are therefore not included in the quality measurement.

4.1.8. Crowdsourcing Findings

Carletti (2016, p. 197) defines crowdsourcing as “a variety of people providing online data, information, and knowledge in exchange for an institutional call for contribution”. In general, it seems that street art websites are not familiar with crowdsourcing approaches (see Table 4).

Table 4

Types of Crowdsourcing Used on Websites

Crowdsourcing types	**n**	**%**
Complementing Collections	14	45,16
Correction and Transcription	5	16,13
Classification	4	12,90
Crowdfunding	3	9,68
Co-curation	1	3,23
Contextualization	0	0,00

According to the findings, the most common method is collection completion with a rate of 45.16% (n = 14). Websites with this feature allow users to add works. Afterward, the most used method is editing and transcription, which is found in 16.13% (n=5) of the websites. In 12.90% (n=4) of the sites, it allowed the classification to be made by the users. Only 9.68% (n=3) of the site users revealed that they could also support the site financially, and only 1 site (3.23%) provided co-curation. On the other hand, 22.58% (n=7) of the websites also carry out commercial purposes. No site has been found that benefits from the contextualization feature, which enables the user to generate new perspectives based on information about works. When we look at which of the crowdsourcing features of the websites, it is concluded that at most 3 features can be found on a site at the same time. 10% (n=3) of websites can be included in this group. 13% (n=4) of the sites have two features and 32% (n=10) of the sites have only one feature of crowdsourcing. None of the crowdsourcing features were found in almost half of the websites (45%, n=14).

The values derived from the websites according to the results of usability and crowdsourcing scores are presented in Table 5.

Table 5

Identifying the Website for Heuristic Analysis

Website	**Usability Score**	**Crowdsourcing Score**	**Total**
Street Art Cities	23	1	24
Public art archive	22	2	24
Global Street Art	22	1	23
Atlanta Street Art Map	19	3	22
Inter Graff	19	3	22
Stencil Archive	17	3	20
LDN graffiti	19	0	19
Art Crimes	17	2	19
Bombing Science	18	1	19
Ecosystem	18	1	19
I support Street Art	17	1	18
Street Art Sheffield	18	0	18
Dunedin street art	16	2	18
Visual Orgasm: The Canadian Climax	17	1	18
Fatcap	17	0	17
Miami Graffiti	15	1	16
Sydney graffiti archive	15	0	15
Tel Aviv Street Art	14	0	14
@ 149 St.	12	2	14

Street art Barcelona	13	0	13
Museum of street culture	13	0	13
50-millimeter Los Angeles	12	1	13
The Hull Warehouses	10	0	10
Nashwriters	9	1	10
Philly Graffiti	10	0	10
Steel City	9	1	10
Crushing Miami	9	0	9
paint.dk	9	0	9
Subway Outlaws	9	0	9
MelbourneGraffiti.com	8	0	8
Railwhores	8	0	8

Street Art Cities and Public Art Archive have the highest scores according to the total results. Usability will be taken as the basis of the heuristic evaluation. Since the usability score is greater than Public Art Archive, the website of Street Art was evaluated in the heuristic evaluation.

4.2. Heuristic Evaluation Findings

The results of the evaluation of the website selected by experts as a result of the formal evaluation are presented in Table 8. Expert evaluations are given in the table under the columns coded U1, U2, U3, U4, and U5, which describe the participants. Each row contains the value received by experts for the proposition based on a usability criterion, the total value, and the percentage of success. In the line at the end of each usability criterion, the total value of that criterion is explained and the next criterion is moved on (see Table 6).

Table 6

Scores and Success Percentages According to Evaluation Criteria

Criteria	U1	U2	U3	U4	U5	Total	Percent
1. Visibility of System Status							
a. The status of an icon is indicated	0,5	1	0	1	1	3,5	70
b. Every display begins with a title or header that describes screen contents	1	1	1	0,5	1	4,5	90
c. A selected button is visible when surrounded by unselected icons.	1	0,5	0	0,5	0,5	2,5	50
d. There is a consistent button design scheme across the application.	1	1	1	0,5	1	4,5	90
Total Score	3,5	3,5	2	2,5	3,5	15	75
2. Match Between System and the Real World							
a. All icons are concrete and familiar.	1	1	1	0,5	1	4,5	90
b. Menu choices are ordered in the most logical way, given me, the item names, and the task variables.	0	1	1	1	1	4	80
c. The selected theme colors are appropriate.	1	1	1	1	1	5	100
d. Menu choices fit logically into categories that have readily understood meanings.	0	1	1	1	1	4	80
e. I can understand the language used in the system	1	1	1	1	1	5	100
f. The words used in the system easy to understand.	1	1	1	1	1	5	100
Total Score	4	6	6	5,5	6	27,5	91,67

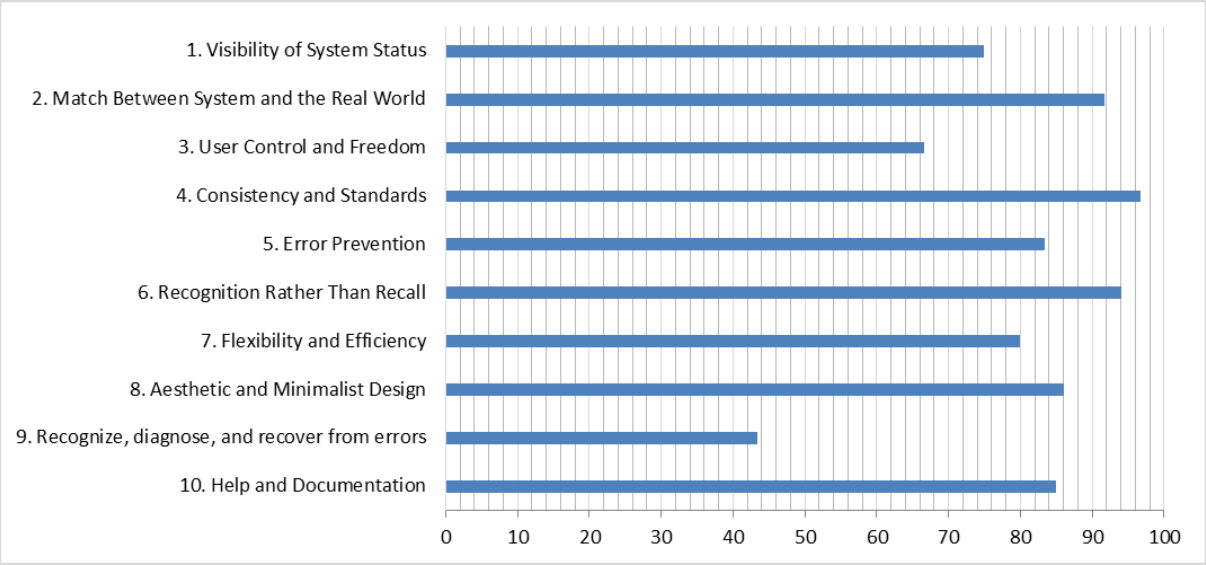
3. User Control and Freedom							
a. I can go back to a previous menu easily.	0	0,5	1	0	1	2,5	50
b. I can move forward and backward between fields or dialog box options.	0	1	0,5	1	1	3,5	70
c. I can easily reverse their actions.	0	1	1	1	1	4	80
Total Score	0	2,5	2,5	2	3	10	66,67
4. Consistency and Standards							
a. Each page has a title.	1	1	1	1	1	5	100
b. Menu titles either cantered or left-justified.	1	1	1	1	1	5	100
c. High-value, high-quality is used to attract attention.	1	1	1	1	0,5	4,5	90
Total Score	3	3	3	3	2,5	14,5	96,67
5. Error Prevention							
a. Menu choices are logical, distinctive, and mutually exclusive.	0	1	1	1	1	4	80
b. The system displays multiple pages.	1	1	1	1	0,5	4,5	90
c. Navigation between pages is simple and visible.	0,5	1	0,5	1	1	4	80
Total Score	1,5	3	2,5	3	2,5	12,5	83,33
6. Recognition Rather Than Recall							
a. Items have been grouped into logical zones.	1	1	1	1	1	5	100
b. Videos or image galleries used to get the user's attention.	1	1	1	1	1	5	100
c. Size, boldface and color are used to show different pages and the importance of different screen items.	1	1	0,5	1	1	4,5	90
d. The same color has been used to group related elements.	1	1	1	1	0	4	80
e. There is good color and brightness contrast between the image and background colors.	1	1	1	1	1	5	100
Total Score	5	5	4,5	5	4	23,5	94
7. Flexibility and Efficiency							
a. Menu lists are short (seven items or fewer).	1	1	1	1	1	5	100
b. I have the option of touching on fields easily.	0,5	1	1	1	1	4,5	90
c. The system offers forward and backward options.	0	1	0,5	0	1	2,5	50
Total Score	1,5	3	2,5	2	3	12	80
8. Aesthetic and Minimalist Design							
a. All icons are in a set visually and conceptually distinct.	1	1	0,5	1	0,5	4	80
b. Each icon stands out from its background.	1	1	0,5	1	0	3,5	70
c. Each data has a short, simple, clear, distinctive title.	1	1	1	1	1	5	100
d. Menu titles are brief, yet long enough to communicate.	1	1	1	1	1	5	100

e. Pop-up or pull-down menus are well-defined.	1	1	0,5	1	0,5	4	80
Total Score	5	5	3,5	5	3	21,5	86
9. Help users Recognize, Diagnose, and Recover From Errors							
a. The system supports both novice and expert users.	1	1	0	1	0	3	60
b. The application has error messages.	0,5	1	1	0	0	2,5	50
c. Error messages suggest the cause of the problem.	0,5	0,5	0	0	0	1	20
Total Score	2	2,5	1	1	0	6,5	43,33
10. Help and Documentation							
a. Information is easy to find.	0,5	1	0,5	1	0	3	60
b. The visual layout is well designed.	1	1	1	1	1	5	100
c. The information is accurate, complete, and understandable.	1	0,5	1	1	1	4,5	90
d. The information is relevant.	1	1	0,5	1	1	4,5	90
Total Score	3,5	3,5	3	4	3	17	85

When the criteria are arranged from the most successful to the least, the outcome appears as shown in Figure 2.

Figure 2

Success Ranking of Usability Criteria



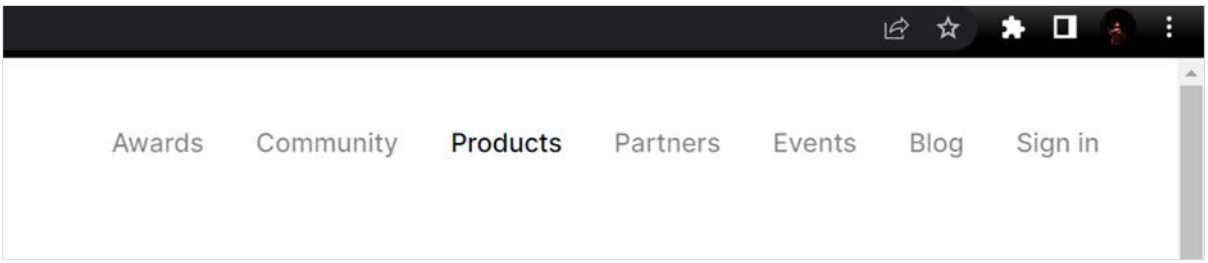
Considering that each 20% represents a level of success defined as “very unsuccessful, unsuccessful, moderately successful, successful, very successful”, the average of all usability criteria appears to be “successful” with a rate of 82.05%. The criterion that seems to be “least unsuccessful”, “Recognition, Diagnosis and Treatment of Errors”, is in the “medium successful” group with a value of 43.33%. On the other hand, the criteria of “User Control and Freedom” (66.67%), “System Status Visibility” (75%), “Flexibility and Efficiency” (80%) were seen as “successful”. The other 6 criteria are in the “very successful” group with values between 80% and 100%. Since there was no criterion with an average below 40%, the groups named “unsuccessful” or “very unsuccessful” remained empty. In order to reveal the problems and positive aspects, each usability criterion was evaluated under the following headings with its own propositions.

4.2.1. System Status Visibility

The System Status Visibility criterion was one of the propositions evaluated in the successful category with an average of 75%. The least successful proposition under this criterion was the option "Selected buttons are clearly visible compared to unselected buttons." It was determined that three of the experts were undecided regarding their agreement with this proposition. On this website, the text color of the buttons is written in black tone on a white page, while selected buttons are shown in a darker black (see Figure 3 and Figure 4). However, it can be said that system status visibility is good in terms of a stable design scheme and the definition of contents with appropriate headings.

Figure 3

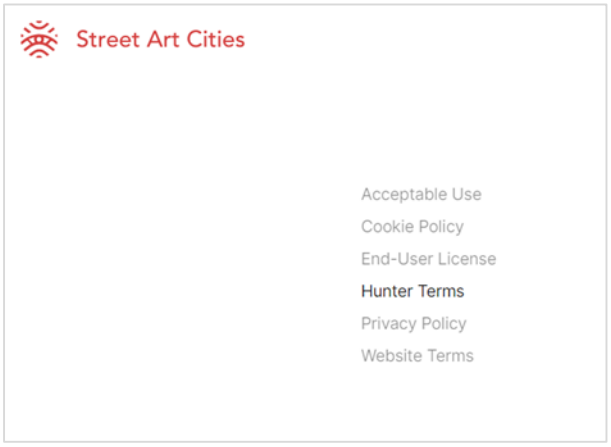
Menu Items



Source: https://streetartcities.com/

Figure 4

Legal Page Menu Items

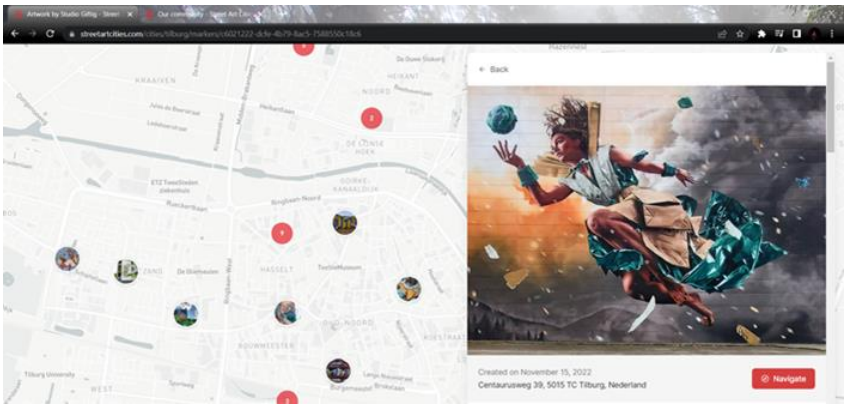


Source: https://streetartcities.com/

On the page where the works are displayed on the map (see Figure 5), there is a small lock icon in the right pane where thumbnails and different information are located. When this icon is clicked, it directs the user to the "dashboard" page. One of the experts suggested that this lock sign in the image gallery is problematic and incomprehensible.

Figure 5

The Location of the Artifacts on the Map



Source: https://streetartcities.com/cities/tilburg

4.2.2. Compatibility between the System and the Real World

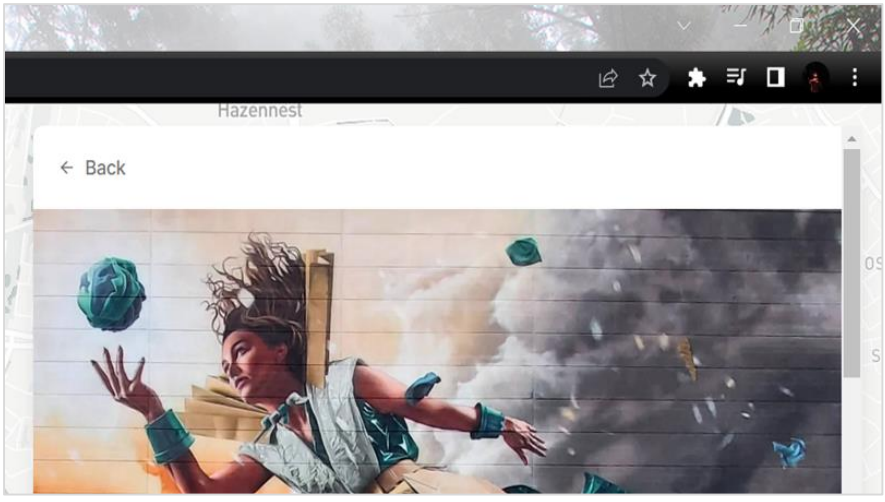
Among the usability criteria, "compatibility between the system and the real world" was found successful by experts with a rate of 91.67%. According to all experts (100%), the language used and the words chosen are easy to understand. In addition, the theme colors were evaluated positively by experts. One of the experts suggested that the colors and menu used on the site are quite impressive, but pose the risk of getting lost among the pages for new/novice users. Another expert stated that the menu options were insufficient and the names given to the menu items were not constructed logically.

4.2.3. User Control and Freedom

The second criterion found least successful by experts is "User control and freedom" (66.67%). In the context of this criterion, half of the experts specifically complained that they could not easily return to the previous menu. An expert who found every proposition in this criterion unsuccessful. He stated that there was no return button in the picture gallery and there was difficulty in returning to the home page. The same expert also stated that navigation was inadequate. There is no button to return to the home page from the collection page. When only one work is selected and the page of the relevant work is opened, a "Back" button appears (see Figure 6). Although the button in question does not direct users to the home page, it allows users to return to the city page on the map.

Figure 6

Back Button



Source: https://streetartcities.com/cities/tilburg/markers/c6021222-dcfe-4b79-8ac5-7588550c18c6

Three of the experts stated that it was difficult to navigate and find direction, especially on the blog page. The page in question is opened on medium.com and there is no way to return to the Street Art Cities website.

4.2.4. Consistency and Standards

Consistency and standards were determined as the most successful (96.67%) usability criteria by experts. All propositions under this criterion were evaluated positively by all experts except only one expert. Only one expert was hesitant to agree with the proposition that high value and high quality are used to attract attention. In the official evaluation, it was seen that the quality of the images on the Street Art Cities website is 4K Ultra HD and therefore it has the highest resolution rating among all the websites. Accordingly, it was thought that the question expert was indecisive because he did not make a detailed quality measurement on the site reviewed.

4.2.5. Error Prevention

Error prevention is a measure that the most of experts (83%) find successful. Two experts responded "I am undecided" to the proposition about making navigation simple and visible between pages. It can be said that this evaluation coincides with the fact that the blog page in the "User Control and Freedom" criterion is opened on a different page and the return button is not functional.

4.2.6. Recognition Instead of Reminder

This criterion was evaluated as the second most successful usability criterion with a success rate of 94%. Experts agree that elements are grouped into logical areas, videos or image galleries attract the user's attention, and there is good color and brightness contrast between image and background colors. On the other hand, under this criterion, "Size, text thickness and colors are used to show different pages and different screen elements." While one expert was undecided about agreeing with the proposition, "The same color is used to group related elements." Their suggestion was found negative by another expert.

4.2.7. Flexibility and Efficiency

This usability criterion was found to be 80% successful. Keeping the menu items short is a proposition that has been unanimously found successful by all experts. The feature noted by experts is that the system does not have forward and reverse options. "The system offers forward and reverse options." Two experts disagreed with the proposition, and one expert stated that he was undecided. This result can be interpreted as showing that the site's inadequacy in navigation may negatively affect different usability features.

4.2.8. Aesthetic and Minimalist Design

Experts found this criterion successful with a rate of 86%. The propositions "Every data has short, simple, clear and distinctive titles" and "Menu titles are short and concise" were deemed successful by all experts. Experts evaluated the proposition of clearly distinguishing the buttons from the background on the website as 70% successful. One of the experts stated that it would be more aesthetic to make better use of the spaces instead of piling up all the content in the middle of the screen.

4.2.9. Recognition, Diagnosis and Treatment of Errors

"Recognition, diagnosis and treatment of errors" is the criterion with the lowest usability level, at 43.3%. "The system is suitable for both beginner and expert users." Two experts disagreed with the statement, and one of the experts pointed out that the colors and visuals were quite impressive, but the multi-option site structure reduced usability, especially for beginner users. The proposition "The application provides error messages" was found negative by two experts, and one expert stated that he was undecided about this proposition. "Error messages predict the causes of the problem." This proposition has not been found positive by any expert. One of the experts encountered an error while testing the registration to the system and pointed out that the e-mail address entered incorrectly during the registration phase was not fully detected by the system.

4.2.10. Help and Documentation

Help and documentation is a usability criterion that is found to be 85% successful by experts. Among the propositions presented based on this criterion, "good design of visual presentation" was approved by all experts. "The relevance of the information to the subject and its accuracy, completeness and understandability" are also among the propositions that the majority (90%) find positive. It can be said that experts agree (60%) on the "ease of accessing information".

5. Results and Discussion

Street art, like every cultural heritage work, needs to be preserved and passed on to future generations. Due to the ephemeral nature of street art, which makes it different from other cultural heritage materials, preservation must be done digitally rather than physically. It is possible for preservation to be carried out not only by cultural memory institutions but also by crowdsourcing methods in which the user directly participates. In this study, street art websites that allow the user to be directly involved in the process were reviewed.

The results obtained within the scope of this research can be listed as follows:

When defining street art, each site uses different metadata fields. No common areas have been developed to identify works across websites or within the street art community. It has been observed that the most frequently used field when defining street art is artist, in line with Graf's (2019, p. 189) result. However, unlike her work, it turns out that the fields following the artist identifier are location and genre. It can be said that such a small number of identifiers is insufficient, as street art requires special fields in addition to the metadata fields used to describe other cultural heritage works.

Most of the sites do not contain any informative text about acquiring works, copying and copyrights. It has been observed that a small number of websites include information on these issues on the "about" or "legal" pages, although not in clear terms. It has been observed that, unlike cultural memory institutions, legal regulations regarding access to the works hosted by street art sites are ignored. These results obtained regarding the work metadata and policies indicate that most street art websites do not have institutional information and policies regarding work copying and copyrights and data for the works.

Crowdsourcing methods are not used sufficiently on street art websites, which require user participation to be digitized and archived. Only less than half of the sites evaluated even allow users to add works to the collection (45.16%). This result shows that the street art websites, users most frequently contribute to the management of street art through the collection completion crowdsourcing method.

According to the intuitive evaluation results carried out by experts of the Street Art Cities website, which has a higher usability level than other examples in the world, the usability of the Street Art Cities is strong on aesthetics and minimalist design and consistency and standards.

The usability criterion in which the site was found to be least successful was the recognition, diagnosis and treatment of errors. Experts pointed out that they could not see enough error messages, and when they did see them, the error messages were insufficient. Another issue that experts emphasize and mention in their comments is the inadequacy of the navigation feature. The facilities provided for the user to reach the desired page or, especially, to return to the previous page were deemed inadequate. Usability measures such as user control and freedom and flexibility and efficiency were found to fail due to the lack of this feature.

6. Future Research Directions

The results obtained at the literature level on the subject have shown that the number of studies on street art in the world is limited. It is thought that the conservation proposal based on the participatory heritage approach can be effective for the sustainable management of not only street art but also other cultural heritage materials. It is thought that the study with this emphasis will make significant contributions to the literature in the field of cultural heritage management. Websites prepared for access to street art

should be redeveloped in the light of new research and user feedback. The following suggestions can be offered for new research at the website development level:

Usability evaluation is required for designed websites. For this evaluation, not only the intuitive evaluation method should be used, but also different types of tests should be performed. According to the evaluation results, the website can be updated and become more useful.

In this research, Computer Education and Instructional Technology experts were used during the intuitive evaluation. In future research, the opinions of researchers in related fields such as street artists, archaeologists, historians, art historians, and information management experts can also be benefited from.

Street art is also photographed and shared on social media sites that were excluded from the scope of this research. New research should be conducted especially on accounts or tags/titles that share street art. Generating new ideas on how the works here can be combined and presented with metadata or how the works can be integrated into a proposed international site may lead to a more efficient platform.

One-on-one interviews with street artists will provide information about their views on copyright, necessary metadata, and street art. Communicating and learning about their needs and ideas will allow the platform to become a more collaborative project.

Research Data

Research data stored in APERTA can be accessed at https://aperta.ulakbim.gov.tr/record/274109

Compliance with Ethical Standards

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