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Development of Virtual Museums in Poland

Abstract. Technological determinism has initiated the revolution of society, laying the foundations of the civilization of knowledge. One of its key principles is the shift of the economic center of gravity to broadly defined services. In many areas, information and communication technology has replaced traditional tools with their digital equivalents. This can be observed, inter alia, at the interface between tourism and culture in the form of virtual museums. The article reviews and analyzes the level of development of selected virtual museums in Poland. Moreover, based in the results of the study and the proposed evaluation model, the author attempted to answer questions about the quality of museum e-services, their competitiveness in relation to traditional museums and, finally, the benefits of developing and maintaining such services.

Key words: e-services, virtual museums, virtual walk, virtual tours

1. Introduction

Museums are a very important element of building and maintaining national identity and one of the key promoters of culture. In 2018, there were 945 active museums in Poland, which were visited by 38.1 million people (an increase of 1.7% in relation to 2017). Of the total number of visitors, 15 million were able to benefit from free admission. The total number of exhibits in museum collections now exceeds 22 million and continues to grow, making this type of cultural activity more attractive. Also very common are occasional museum initiatives such as the "museum night", attended by as many as 866 thousand people in 2018 [GUS 2019: 2, 3].

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In the world of omnipresent information, museums have gained in importance and their tasks have broadened with the appearance of previously unavailable possibilities, such as recording and archiving collections as well as sharing collections in digitized versions. There is also an additional aspect worth consideration: "creative activity – creating culture, reality, sometimes art, which is realized in a digital virtual area" [Folga-Januszewska 2008: 40]. The most spectacular and effective tool in the IT resources of museums is the possibility of offering virtual tours. The only key question that arises is how virtual tours actually affect classical cultural tourism? Are they a threat or maybe an opportunity to promote and disseminate knowledge among young people, who so much value all kinds of technical innovations?

The purpose of the article is to answer the above and other related questions by means of analyzing data collected from two basic sources: reports, databases and other analytical studies available online, as well as from two studies conducted by the author in 2017 and 2019. This approach enables comparative analysis and a better understanding of the causes, interactions and facts that are shaping the studied phenomena.

Two research hypotheses were formulated. The first one concerns the quality of services: like e-administration [Mazur, Mazur, Mendyk-Krajewska 2018: 203-216], the offering of e-museums in Poland is unsatisfactory. The complementary hypothesis is as follows: the services of virtual museums are a substitute and competition for classic museums.

2. Use of digital technologies in Polish museums

Pioneering activities related to the digitization of museum collections in Poland began in the 1980s. The first DOS-based text database was created in 1989. In 1995, the first study was conducted in order to determine the level of computer implementation in museums [Folga-Januszewska, Jaskanis 1996: 74-85]. The current reality of modern society based on information exchange makes all multimedia an important and indispensable feature that attracts audiences, especially in the sphere of cultural tourism [Gajda 2016: 24]. As a result, all cultural institutions require restructuring through the introduction of modern digital techniques. This is also true of museums which, faced with the threat of digital exclusion, had to implement numerous modern ICT solutions in order to evolve towards virtual museums, both in terms of terminology and character. It is worth pointing out that there is no universal, generally accepted definition that of the term "virtual museum"[1] that provides a systematic list of solutions or modern information technologies that should be applied in virtual museums.

[1] The terms "e-museum" and "digital museum" are synonyms that can be found in the literature.

As information technology becomes more ubiquitous, it is changing more and more areas of life, including services, devices and functionalities. Its pervasive and convergent character is at once an obstacle and a creator of completely new possibilities. In practice, museums use the following digital capabilities:

– Internet, social media, forums, etc. to communicate with recipients and to create communities,

– websites, for communication, informational purposes and for marketing purposes,

– interactive solutions to enrich stationary exhibitions and collections – e.g. touch screens with additional information, descriptions or films that are placed next to museum exhibits,

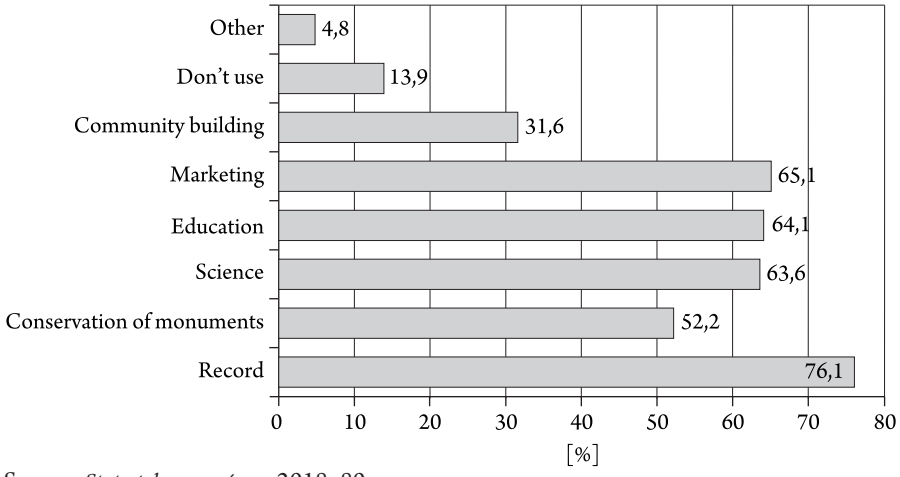
– virtual walks through rooms, gardens and museum buildings with the possibility of viewing exhibits,

– databases containing digital catalogues of collections in the form of photographs (2D), three-dimensional models (3D) and multimedia,

– other digital functionalities, such as games, exercises, mechanically operated and controlled exhibits, etc.

Museums use digital materials for different purposes, as evidenced by the data presented in Chart 1. In the largest number of cases (76.1%) digitized content serves for recording purposes. Other significant applications include marketing activities (65.1%), education (64.1%), science (63.6%) and conservation (52.2%). Only less than 14% of the surveyed museum units declared that they did not use their digital resources, which, given the relatively short period of intense work aimed at accelerating the development of information society, seems to be a very decent result.

Chart 1. The use of digital collections by museums in 2017 in Poland



Source: *Statystyka muzeów…* 2018: 80.

Making collections available in electronic form is not an unambiguous matter in Poland. Almost 20% of the surveyed museums reported that they had problems with making objects available to the public online. The main barriers listed by respondents include difficulties in determining the legal status of items from the collection, ownership of items to which third parties have rights, differences in the interpretation of regulations concerning the public sharing of collections, doubts regarding the public sharing of collections under open licenses or possession of so called orphan works [*Statystyka muzeów…* 2018: 80].

Internet users have also reported some inconveniences related to the use of digitized collections. Reported issues include difficulties with browser plug-ins, inability to download objects, unclear, unreadable and non-intuitive website design. Moreover, users made comments about the quality and limited use of objects, fees for using resources, difficulties in finding objects, lack of facilities for the disabled and the lack of responsive or adaptive web design to facilitate the use of mobile devices [Dzięglewski, Fiń, Guzik 2015: 67].

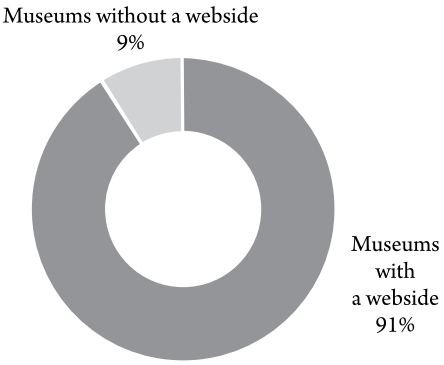
Museums offer a specific type of service related mainly to the promotion of culture. However, they also operate in the tourist and economic environment. One of the basic tools enabling efficient and effective functioning in these environments is having a website. In this respect, as shown in Chart 2, 91% of all museums in Poland in 2017 had their own websites.

The proportion shown in Chart 2 should be assessed as relatively good, especially if Polish museums are compared with European companies in general: the average share of website owners in the total number of entities was only 77%. In the European Union, Finland had the highest proportion (96%) while Romania – the worst (only 45%). Of course, these figures also come from 2017[2] [GUS 2018: 75].

Information and communication technologies implemented by museums constitute a considerable challenge in terms of organization, know-how and costs. One study carried out by Dorota Folga-Januszewska contains the following observation: "The accessibility of information about Polish museum collections varies and has significant economic consequences. It can be argued that the lack of investment in the computerization of museums not only contributes to their economic collapse but also contributes to deculturation, especially among young Internet users seeking knowledge by exploring resources of foreign museums" [Folga-Januszewska 2008: 21]. This opinion emphasizes the important role of financial support and stimulation of changes in Polish museology, especially when

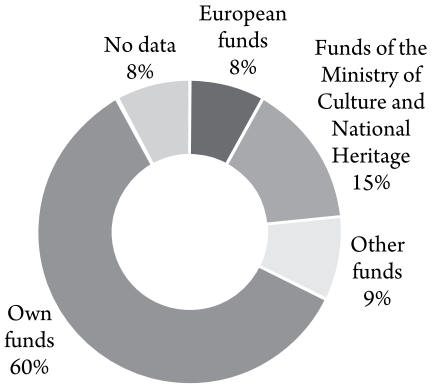
[2] It should be noted that this is not a completely objective comparison because the need to have a website is strongly correlated with the company's type of business activity; however, it is worth emphasizing that more and more museums are becoming private entities and have to compete for customers.

Chart 2. Museums in 2017



Source: *Statystyka muzeów…* 2018: 49.

Chart 3. Sources of financing used by museums in Poland to digitize and share their collections in the period 2012-2017



Source: *Statystyka muzeów…* 2018: 88.

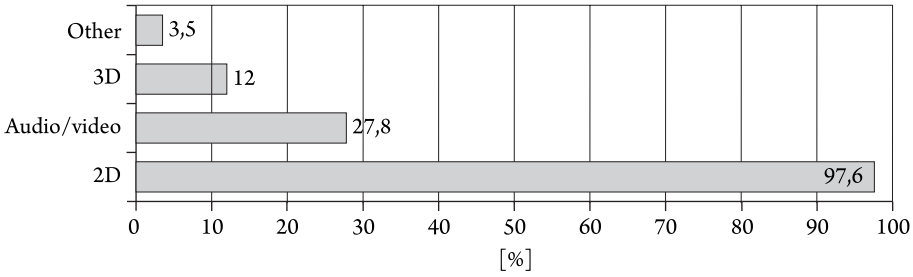
it comes to the introduction of new technologies. Unfortunately, most museums have to use their own funds as they are unable to obtain external financing. This observation is confirmed by the data presented in Chart 3, which shows that over a period of 5 years (from 2012 to 2017) only 9% of museums in Poland received EU funding for digitization.

Digital collections of museums are made available to Internet users in various ways. The most impressive form is a virtual tour offering full interactivity and freedom of movement, as well as the possibility of using VR[3] glasses. However, to implement such solutions, it is necessary to create a complex dedicated application, which is expensive and time-consuming. So far, to the best of the author's knowledge, no museum in Poland offers such a service.

Virtual tours typically feature scenes and panoramas with additional options (e.g. voiceover). Slightly less spectacular forms of presentation include three-dimensional models, which make it possible: "to see objects in a way that is usually impossible during a simple visit to a given cultural institution. It offers different perspectives of a given object or an opportunity to see elements that are normally inaccessible to the visitor" [Maźnica 2016: 42]. Other techniques include 2D mapping, e.g. photos and films. Chart 4 presents ways in which museums make their digital collections available online. As it turns out, the most popular form of sharing archived digital collections is photography. 3D models are offered by only 12% of all museums.

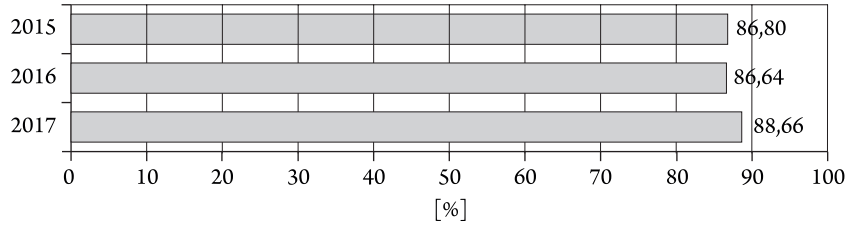
[3] Glasses that enhance the experience of virtual reality.

Chart 4. Percentage of museums using different forms of sharing digital cultural objects online



Source: Dzięglewski, Fiń, Guzik 2015: 33.

Chart 5. Percentage of museums with social media presence (institutional profiles) in 2015-2017



Source: *Statystyka muzeów…* 2018: 49.

Table 1. The use of the most popular social media by Polish museums (based on 2015 data)

Social media channels	Characteristics
Facebook	36 profiles, the most popular maintained by the Auschwitz Museum (187 thousand fans) and the Warsaw Uprising Museum (157 thousand fans).
YouTube	181 channels, the most popular maintained by the Warsaw Uprising Museum and the Museum „Poland on Wheels". The channels had over 5 thousand subscribers.
Instagram	30 profiles, the most popular one maintained by the Museum of Warsaw with 5 863 followers.
Twitter	56 profiles, the most popular ones maintained by the Warsaw Uprising Museum (4.2 thousand followers) and the Museum of Modern Art in Warsaw (1.2 thousand followers).
Pinterest	28 boards, but most of them have very few followers and contain few pictures.

Source: Ciemniewska, Pliszka 2017: 36-45; Stańska 2013; 2014.

The Internet is an excellent communication platform. According to the Report of the National Institute of Museums and Collections Protection, in 2017 museums were very keen to use social media (Chart 5), paying less attention to multimedia (only 16% used this solution) [*Statystyka muzeów…* 2018: 51].

Chart 5 shows a growing trend, which can be interpreted as evidence of the increasing awareness of the role of this form of information among the management of museums. As a result, in 2017 almost 90% of museums social media profiles to promote culture in the digital world. Detailed data on their achievements in this area are shown in Table 1.

3. The e-museum service in the light of data from surveys and official reports[4]

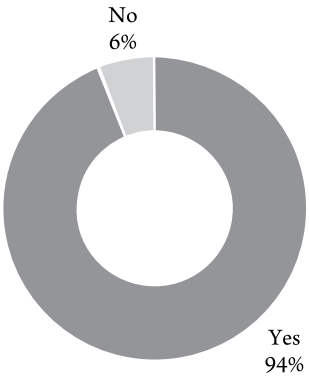
E-museums function in virtual reality. They can be accessed via the Internet. Most often e-museums provide their services via websites but sometimes they can be accessed through dedicated applications. Users must therefore have direct or indirect access to the Internet. Most Internet users believe that all contents posted online should be available for free (75% of respondents [Gemius/PBI, 2012]). This view is also shared with regard to culture as shown in Chart 6.

For the vast majority of Internet users free online content is important or even very important (90% of respondents [Sekuła 2012]). This view can be explained by three main factors: the fact that the Internet content was supposed to be free of charge and not regulated in any way, the common fact of online piracy and the relatively low level of financial wellbeing of the Polish society.

In the context of virtual museums, this view seems to be inappropriate and can have a detrimental effect on institutions and users alike. Reference can be made to the following definition: "The contemporary museum remains a permanent institution, which must generate income in order to survive; it serves the needs

[4] This section describes results of two surveys conducted by the author. The first one was a survey of respondents' preferences and knowledge about e-services (23 e-services were considered, including e-museums). The survey lasted from March to June 2016. In order to ensure representativeness, the minimum sample size was set (calculated) at the level of 385 respondents. 500 correctly completed forms were collected, which were the basis for statistical inference. The results of the survey were used in the PhD thesis entitled "Economic and social benefits of broadband Internet in the context of development of information society in Poland". These results will be referred to in this article using the phrase: "based on survey A". The second survey was a pilot survey, conducted in June and July 2019. A group of students was asked to share a link to an online survey questionnaire among members of social media groups associated with culture and museums. A total of 648 questionnaires were collected, but with a high rate of item nonresponse. The results of this survey will be referred to in the article using the phrase: "based on survey B".

Chart 6. Should e-museum services be free of charge?

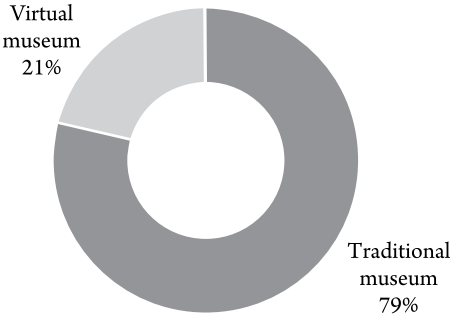


Source: based on data from survey B.

of the nation and its policy of defining its identity and values; it is publicly accessible also via the Internet, it studies evidence of human activity and human environment, prepares collections, preserves and protects collections or storage media that contain them, makes them available and presents them to the public, creates new realities with educational and imaginative value, and provides entertainment" [Folga-Januszewska 2008: 54]. The quality of services offered by museums and the range of their exhibits depends on their financial situation. As nonprofit institutions, museums are often forced to make their collections or services available for free as they are under pressure from the online community, regulatory restrictions and prosocial provisions in project contracts for EU funding. This leads to the shortage of financing, particularly for the purpose of expanding collections and, consequently, to a decline in the quality of service and gradual pauperization.

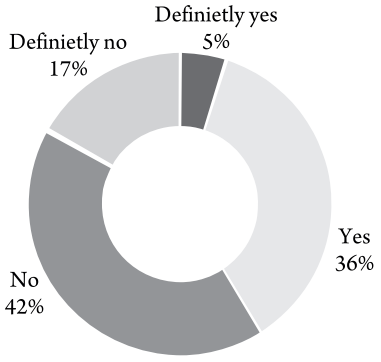
Chart 7 and Chart 8 present opinions about the comparison between traditional and virtual museums. The first one concerns the attractiveness of each type of museum. For the vast majority of respondents (79%), a personal visit at

Chart 7. Is virtual or traditional museum more attractive for visitors?



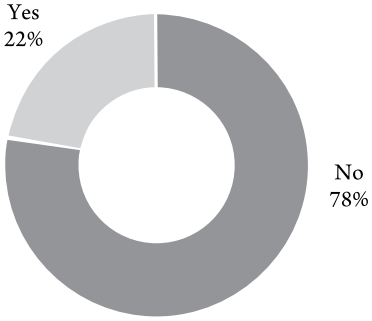
Source: based on data from survey B.

Chart 8. Is an e-museum service of high technical and substantive quality competitive in relation to its non-digitalized counterpart?



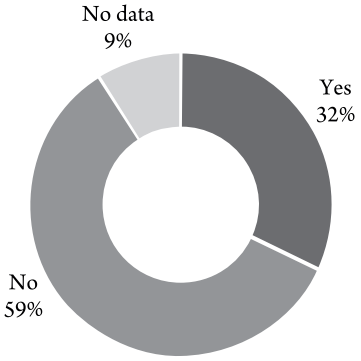
Source: based on data from survey B.

Chart 9. The use of virtual museums



Source: based on data from survey A.

Chart 10. The use of virtual museums



Source: Ciemniewska, Pliszka 2017: 62.

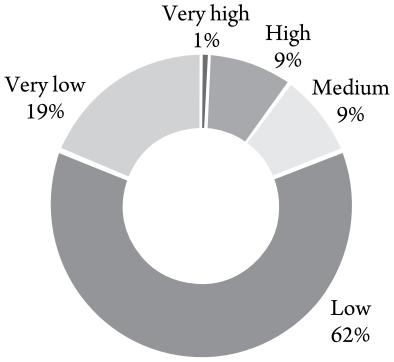
a museum is more preferable. This finding is not quite consistent with the data in Chart 8, according to which 41% of respondents believe that an e-museum service of high technical and substantive quality is competitive in relation to its non-digitalized counterpart.

This lack of consistency is only apparent. It can be assumed with high probability that such a discrepancy in views is the result of the technical quality of virtual museum services, because, as can be seen in Chart 8, opinions based on user experience are not positive for most e-services in Poland [Mazur, Mazur, Mendyk-Krajewska 2018: 203-216].

It should be pointed out that relatively few people are familiar with the offering of e-museums available in Poland. Chart 9 and Chart 10 show that this type of services is used by a relatively small number of Internet users – only by 22% of respondents in survey A and 32% of respondents surveyed for the report "Analysis of users of the e-museum project" [Ciemniewska, Pliszka 2017: 62]. The difference in results is small and may be due to the growing awareness and experience of Internet users: Chart 9 shows data for 2016, while Chart 10 – data for 2017.

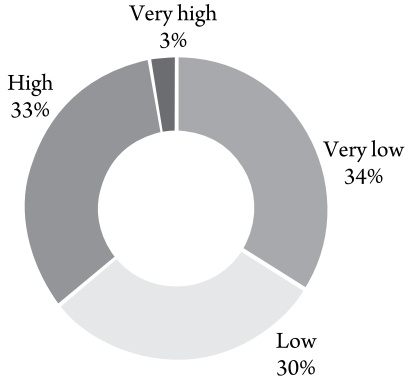
The role of transmission media has changed over time. Initially, they were the functional basis for the information society, but when their capacity reached sufficiently high bandwidth to enable all currently available services and organizational solutions, attention has shifted to the fastest possible creation of optimal results in the economic and social spheres. This goal can be achieved by developing e-services, which, from the perspective of the public and entrepreneurs, are the most noticeable effects of attempts to build a knowledge society. One may ask: "how advanced are e-museums in the development of e-services"? The answer can be found in Chart 11 and Chart 12.

Chart 11. Perceived quality of service provided by virtual museums in Poland (respondents' opinions from 2019)



Source: based on data from survey B.

Chart 12. Perceived level of sophistication of virtual museums in Poland (respondents' opinions from 2016)



Source: based on data from survey A.

According to the respondents, the situation does not look very satisfying, either in terms of sophistication or as regards the quality of services provided by virtual museums. The majority of respondents assessed the quality as poor or very poor (81% of answers, see Chart 11). The level of sophistication is also largely perceived as low: as many as 64% of respondents rated it as "low" or "very low" (Chart 12).

4. Assessment model and results of the analysis

The author designed a model for the evaluation of virtual sightseeing services offered by Polish museums. It was based on the spatial list and map (Fig. 1) with aggregated centers that offer the above mentioned functionalities.[5]

Digital museums offer at least several different types of services. Only one of them, the virtual tour, was evaluated because of its potential and similarity to traditional museum tours.

The map in Fig. 1 shows 112 museums, but only 102 virtual walks could actually be executed. The remaining ten could not be completed owing to technical and IT errors and it was unclear whether they were temporary or permanent; as a result, the museums in question were disqualified and removed from the study.

[5] It should be noted that the list was not checked for relevance as it contained a very large number of items (112 items), which the author considered sufficiently representative to provide an overall picture of the development of the virtual museum tour service in Poland.

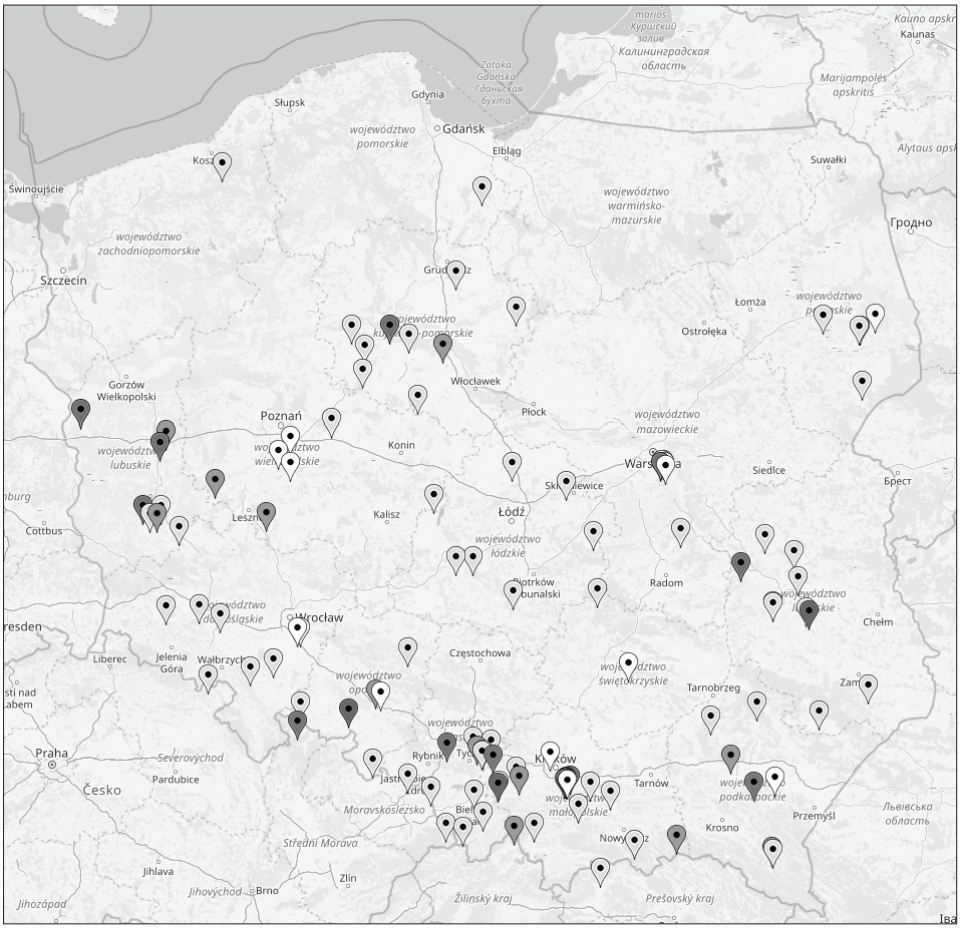


Fig. 1. Museums offering virtual tours

Source: https://www.e-muzeum.eu [accessed: 4.08.2019].

The analytical apparatus consists of eight elements (subindexes), which are differently weighted and scored[6]. The general structure is illustrated in Fig. 2.

The best results in this type of qualitative analysis are achieved by applying the Delphi method, especially in cases where a given phenomenon needs to be assessed using a multi-criteria research tool. Experts' opinions can be used to limit errors and minimize the subjectivity of the researcher. However, this is

[6] Score ranges are related to the type of factor. For example, *'additional options'* were identified as a factor of medium importance, but a given museum may receive 0 points when its virtual service does not offer this type of functionality; for example, a sub-index of *'graphics'* cannot take the value of 0, because there is always a better or worse visual design; if it is very weak, the museum will get the lowest rating, which is 0.5.

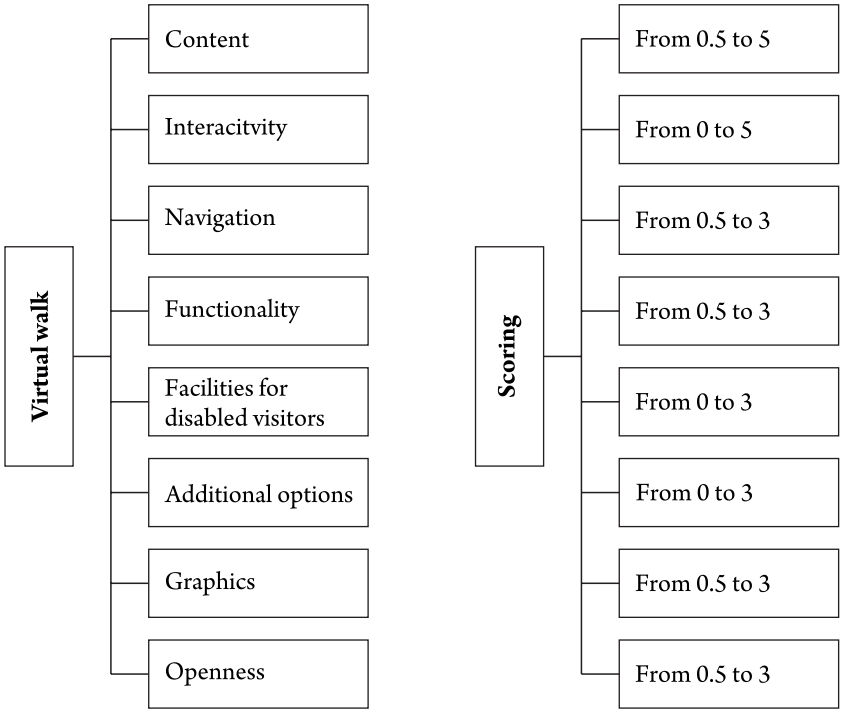


Fig. 2. Architecture of the assessment model

Source: own.

a time-consuming activity, requiring considerable financial resources. In this case, weights were determined by deduction and causal reasoning. The research model built by the author is a conceptual tool, which is the starting point for further discussion. The results obtained by applying the model are by no means final and indisputable. Rather, they are used to study trends and follow general directions of observed changes. Presented below is a brief description of the eight sub-indexes that make up the assessment model.

Content – the size of digital resources made available to the user; in particular the number of panoramas, their expansion, additional materials, photos, 3D models, the possibility of visiting not only the inside of the building but also the option of viewing it from outside if it is architecturally interesting, the possibility of a virtual walk in the museum park, etc.; the score ranges from 0.5 to 5, so this component was judged to be a factor of high importance.

Interactivity – the possibility of undertaking additional actions during the walk, usually associated with obtaining information about exhibits, which in-

creases the feeling of realism and gives the user an opportunity to better understand the collections; in a developed form it can be, for example, the possibility of enabling a monitor located in the corridor of the museum with additional information, etc... Scoring: from 0 to 5, which means it is a factor of high importance.

Navigation – functionality and intuitiveness of navigation mechanisms used to move in the virtual world; readability of icons and navigation tools, etc. Scoring: 0.5 to 3, which means it is a factor of moderate importance.

Functionality – smooth and trouble-free operation of the application; no jams, fast transition between locations (quick loading of locations). Scoring: from 0.5 to 3, which means it is a factor of moderate importance.

Facilities for disabled visitors – important especially for the visually impaired and persons with impaired hearing; typical features include text-to-speech readers or prerecorded messages and information; menu narration; narration while walking, possibility of enlarging the font; etc. Scoring: 0 to 3, which means it is a factor of moderate importance.

Additional options – these include sound effects, relaxing music, postcards, links to movies, animations, etc.; Scoring: 0 to 3, which means it is a factor of moderate importance.

Graphics – it comprises graphical design of, for example, navigation or menu elements; the use of graphical themes that are coherent with the subject matter of a given museum, but at the same time easily legible and intuitive. Scoring: 0.5 to 3, which means it is a factor of moderate importance.

Openness – freedom of movement during the walk; this is a very significant factor, which increases the impression of realism and the sense of "openness" of a given location. Scoring: 0.5 to 3, which means it is a factor of moderate importance.

All virtual walks were tested in similar conditions – constant speed of Internet connection (monitored); applications running on the same device – a laptop (which led to discarding a ninth sub-index from the analysis: the possibility of a virtual walk and its quality when using VR glasses), the tests were carried out for three days at similar hours (between 9 a.m. and 12 a.m.).[7] Detailed results of the analysis are presented in Table 2.

The maximum possible score for a virtual tour service was 28 points. The lowest possible score was 2.5 points, while the average possible score was 15.25. The research results are presented graphically in Chart 13.

In Poland, many museums offer virtual sightseeing services, which creates ideal conditions for analysis and evaluation as the source material is vast and easily accessible. After analysing the assessments (Table 2 and Chart 13), the following conclusions can be formulated.

[7] The analysis took place in August 2019.

Table 2. Assessment of e-museum tour services

E-Museum	Content (from 0.5 to5)	Interactivity (from 0 to 5)	Clear navigation (from 0.5 to 3)	Speed of the system (from 0.5 to 3)	Facilities for disabled visitors (od 0 do 3)	Additional options (from 0 to 3)	Ggraphical design (from 0.5 to 3)	Virtual tour (from 0.5 to 3)	Sum
1	2	3	4	5	6	7	8	9	10
The Lubuski Land Museum in Zielona Góra	2	2	2	2	2	2	3	1	16
The National Museum of Agriculture and Agricultural and Food Industry in Szreniawa	2	2	2	2	0	1	3	2	14
The Museum of Pieskowa Skała Castle.	2	2	2	2	1	1	2	2	14
Museum of the Pałuki Land	2	0	2	1	1	3	3	1	13
The Chateau Museum in Pszczyna	1.5	0	3	2	0	1	3	2	12.5
The Museum of Modern Art in Wrocław	2	0	3	2	0	0	3	2	12
The Castle Museum in Łańcut	1.5	0	3	3	0	0	2	2	11.5
Prof. Stanisława Fischer Museum in Bochnia	2	0	2	1	2	1	2	1.5	11.5
The Museum of the National Army in Kraków	2	1	2	1	2	0	2	1.5	11.5
Międzyrzecz Reinforced Area – Museum of Fortifications and bats in Pniewo	1	1	2	2	0	1	2	2	11
The Solec Museum in Solec Kujawski	1	2	2	1	1	0	3	1	11
Malbork Castle Museum	2	1	2	1	0	1	3	1	11
The Museum of Folk Architecture in Sanok	1.5	0	2	2	1	1	2	1.5	11
The Museum of Archaeology in Kraków	1.5	1	1	2	1	1	2	1.5	11
The Moravian Museum in Międzyrzecz	1.5	1	2	2	0	1	2	1	10.5
The Museum of Biłgoraj Land	0.5	0	2	2	2	1	2	1	10.5
The Polish Academy of Arts and Sciences	1.5	2	2	1	0	1	2	1	10.5
The Museum of Zamość	1	0	2	2	2	0	2	1	10
The museum of Koszalin	1	0	2	3	0	0	2	1	9
The military Museum of Zielona Góra – Drzonów	1	0	2	3	0	0	2	1	9
The Archaeological Museum of Kruszwica	1	1	2	1	0	1	2	1	9
The Ground Forces Museum of Bydgoszcz	1	0	2	2	0	0	1	3	9
The Warsaw Uprising Museum	1	0	1	2	0	1	3	1	9
The Kazimierz Pulaski Museum in Warka	1	1	2	2	0	0	2	0.5	8.5
Castle Museum in Baranów Sandomierski	1	0	1.5	2	0	1	2	1	8.5
The regional Museum of Głubczycka Land	1.5	1	1	1	0	1	2	1	8.5
Castle Museum in Niepołomice	2	0	1	2	0	1	1.5	1	8.5
The National Museum in Krakow	0.5	0	0.5	2	2	1	2	0.5	8.5
The museum of Chrzanów	0.5	2	1.5	2	0	0	2	0.5	8.5
The Museum of the Fortress of Kostrzyn	1	0	2	2	0	0	2	1	8
The Archaeological Museum of the Middle Nadodrze in Zielona Góra – Świdnica	1	0	2	3	0	0	1	1	8

Table 2 – cont.

1	2	3	4	5	6	7	8	9	10
The Museum of the First Piasts on Lednica	1	0	2	2	0	0	2	1	8
The Museum of the Szubin Region	1	1	2	1	0	0	2	1	8
The Museum of the Krajeńskie Land in Nakło nad Notecią	1	1	2	1	0	0	2	1	8
The Museum of Lowicz	3	0	2	1	0	0	1	1	8
The Museum of Good-night stories in Rzeszów	1	1	1.5	2	0	0	1	1.5	8
Polish Aviation Museum in Kraków	1	0	1	1	2	1	1	1	8
The Archdiocesan Museum in Kraków	0.5	0	1	2	2	0	2	0.5	8
The Museum of the History of Polish Jews POLIN in Warsaw	1	0	1	2	1	1	1	0.5	7.5
Municipal Museum in NowaSól	1	0	2	2	0	0	1	1	7
The Museum of the Ravian Land in Rawa Mazowiecka	1	0	1	1	1	1	1	1	7
The Zamoyski Museum in Kozłówka	1	0	1	2	0	1	1	1	7
The Copper Museum in Legnica	1	0	1	1	0	1	2	1	7
The Air Force Museum in Dęblin	1.5	0	1	2	0	0	1	1	6.5
The Museum of Kocek History	0.5	1	1	2	0	0	1	1	6.5
The Regional Museum of the Polish Tourist Country-Lovers' Association in Dobczyce	1	0	1	1	0	1	1.5	1	6.5
The Museum of Modern Art in Krakow	1	1	2	1	0	0	1	0.5	6.5
The Ethnographic Museum in Toruń	1	0	2	1	0	0	1	1	6
The District Museum in Sieradz	1	0	1	1	0	1	1	1	6
The Regional Museum in Kutno	1	0	1	2	0	0	1	1	6
The National Museum in Kielce	1	0	1	2	0	0	1	1	6
The State Museum at Majdanek	1	0	1	2	0	0	1	1	6
The Henryk Sienkiewicz Museum in Wola Okrzejska	1	0	1	2	0	0	1	1	6
The Museum of the Karwacjans and Gladysze Manor House in Gorlice	1	0	1	2	0	0	1	1	6
The Museum – Castle Complex in Niedzica	1	0	1	2	0	0	1	1	6
The Museum of Architecture in Wrocław	1	0	1	2	0	0	1	1	6
The Central Museum of War Creditors in Łambinowice	1	0	1	2	0	0	1	1	6
The Museum of Polish Song in Opole	1	1	1	1	0	0	1	1	6
The Cieszyn Silesian Museum	1	0	1	2	0	0	1	1	6
The Vistula Ethnographic Park in Wygiełzów	1	0	1	2	0	0	1	1	6
The Museum of Royal Castle in Warsaw	1	0	0.5	2	0	0	1	1	5.5
The Ustroń Museum in Ustroń	0.5	0	1	2	0	0	1	1	5.5
The Auschwitz-Birkenau State Museum in Oświęcim	1	0	1	2	0	0	1	0.5	5.5

Table 2 – cont.

1	2	3	4	5	6	7	8	9	10
The Podlaskie Museum of Białystok	1	0	1	1	0	0	1	1	5
The Historical Museum in Bialystok	1	0	1	1	0	0	1	1	5
The Museum of Icons in Supraśl	1	0	1	1	0	0	1	1	5
The Museum of Turk City	1	0	1	1	0	0	1	1	5
Museum of the History of the City of Zduńska Wola	1	0	1	1	0	0	1	1	5
The Regional Museum in Opoczno	0.5	0	1	1	0	0	2	0.5	5
The Museum of Royal Łazienki Park in Warsaw	1	0	1	1	0	0	1	1	5
The Boleslaw Prus Museum in Naleczow	0.5	0	1	2	0	0	1	0.5	5
The Regional Museum in Stalowa Wola	1	0	1	1	0	0	1	1	5
The Historical Museum in Sanok	1	0	1	1	0	0	1	1	5
The Regional Museum in Chojnów	0.5	0	1	2	0	0	1	0.5	5
The Jan Dzierżon Museum in Kluczbork	0.5	0	0.5	1	1	1	0.5	0.5	5
The Wawel Royal Castle. National Art Collection	0.5	0	1	2	0	0	1	0.5	5
The Municipal Engineering Museum in Kraków	0.5	0	1	2	0	0	1	0.5	5
The Castle Museum in Oświęcim	1	0	1	1	0	0	1	1	5
The museum of Będzin	1	0	1	1	0	0	1	1	5
The Museum of the History of Katowice	1	0	1	1	0	0	1	1	5
Silesian Museum	1	0	1	1	0	0	1	1	5
The Museum of the Upper Silesian Ethnographic Park in Chorzów	1	0	1	1	0	0	1	1	5
Upper Silesian Museum in Bytom	1	0	1	1	0	0	1	1	5
The Museum of Sanitary Technology in Gliwice	1	0	1	1	0	0	1	1	5
The Regional Museum in Wolsztyn	1	0	1	1	0	0	1	0.5	4.5
The Palace Museum in Rogalin	1	0	1	1	0	0	1	0.5	4.5
The Regional Museum in Nowy Sącz	1.5	0	0.5	1	0	0	0.5	0.5	4
The Museum of Ceramics in Bolesławiec	0.5	0	1	1	0	0	1	0.5	4
The Central Museum of Firefighting in Mysłowice	0.5	0	1	1	0	0	1	0.5	4
The Regional Museum in Bełchatów	0.5	0	1	1	0	0	0.5	0.5	3.5
The Folk Museum in Kolbuszowa	0.5	0	1	1	0	0	0.5	0.5	3.5
The Household Museum in Ziębice	0.5	0	1	1	0	0	0.5	0.5	3.5
The Museum of Gas Industry in Paczków	0.5	0	1	1	0	0	0.5	0.5	3.5
The Museum of the Opole Village in Opole	0.5	0	1	1	0	0	0.5	0.5	3.5
The Museum of Racibórz	0.5	0	1	1	0	0	0.5	0.5	3.5
The Historical Museum in Bielsko-Biała	0.5	0	0.5	1	0	0	1	0.5	3.5
The Żywiec Ethnographic Park in Ślemień	0.5	0	0.5	1	0	0	1	0.5	3.5

Table 2 – cont.

1	2	3	4	5	6	7	8	9	10
The Museum of the Silesian Weaving in Kamienna Góra	0.5	0	0.5	1	0	0	0.5	0.5	3
The Museum of Wodzisław Śląski	0.5	0	0.5	1	0	0	0.5	0.5	3
Rev. Dr Władysław Łęga Museum in Grudziądz	0.5	0	0.5	1	0	0	0.5	0.5	3
The Museum of Bielsko Podlaskie	0.5	0	0.5	1	0	0	0.5	0.5	3
The Museum of Tykocin	0.5	0	0.5	1	0	0	0.5	0.5	3

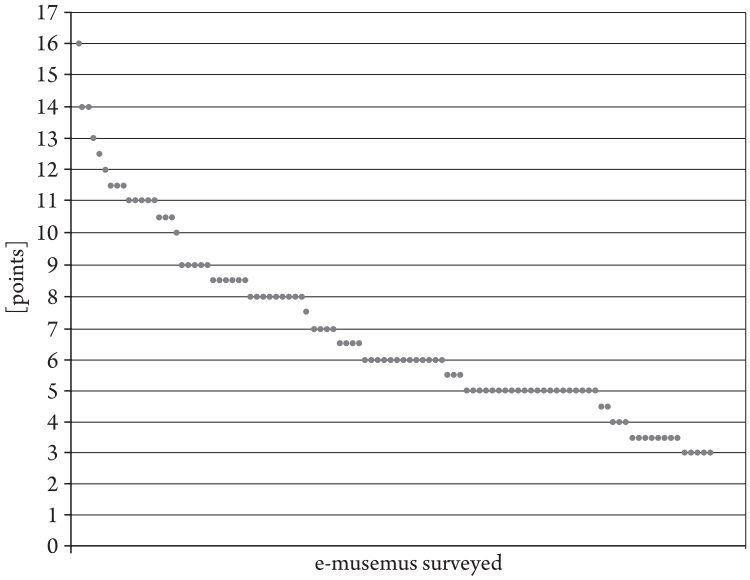
Source: own research.

Most of the virtual walks are based on a few repetitive and commonly used Internet applications. Dedicated solutions are very rare.

It can be seen that systems of the same type are used in the same area (within a given district or province different museums often use the same application), which may be the result of regional cooperation within a given administrative unit and frequent communication or participation in a common development project.

Another common practice is connecting a digital museum walk to a larger general virtual tour of the whole city or even the region. In such cases, museum panoramas are very poor, offer limited information and few interesting additional services.

Chart 13. Evaluation of e-museum tour services



Source: own research.

Based on the assessment, it can be concluded that the sophistication level of Polish virtual museums as far as virtual tours are concerned is very low. Although the majority of museums offer such services, they seem only to serve marketing purposes and do not take advantage of the potential functionality that such resources offer. This situation would be understandable if the respondents (Chart 7) were not convinced that a virtual tour can be a valuable substitute for a physical tour, only taking into account tourism and recreation criteria. However, virtual tours in Polish museums do not seem to be a substitute for physical tours but rather serve as complementary solutions. Therefore, there is no explanation for their poor quality and superficial character. According to one view "some museums do not have items that are spectacular enough to be shown in an attractive way" [Maźnica 2016: 9]. However, this point of view is very limited given the fact that the perception of a virtual tourist is affected by more elements than just the range and attractiveness of exhibits or architectural objects. A properly executed and high quality virtual tour can be interesting in itself provided that the participant is given a fairly large degree of freedom. It seems that museums treat the information revolution as a necessary evil rather than an opportunity, and virtual sightseeing services are not seen as a powerful tool for promoting culture and tourism but merely as an obligatory feature that represents current standards of the modern world.

With respect to the data presented in Table 2 and Chart 13, it can be noted that only the service offered by the Lubuski Land Museum in Zielona Góra was rated above the mean score (by merely 0.75 point). The lowest rating of 3 was given to five museums (i.e. just 0.5 point above the lowest possible score).

5. Summary

Efficient e-services are among the key features of the accelerating development of the information society. They influence more and more areas of human life, enabling new fields of application, such as remote surgery. Their expansion seems inevitable and should be interpreted as a great opportunity for the economy and society. However, they are also associated with threats. One such threat is delayed implementation and adoption of digital technologies and services. In modern society, such information exclusion is increasingly becoming synonymous with social exclusion. In order to eliminate this threat, the ICT sector should be given special significance and should be supported, thoroughly analyzed, stimulated and monitored.

This is confirmed by the findings of the study (even if with respect to just one e-service). The survey results indicate that most museums in Poland create digital content and use it mainly for recording collections of exhibits (Chart 1). Most mu-

seums (over 90%) have their own website (Chart 2). Digitization and computerization is mainly (and unfortunately) financed by the museums themselves (Chart 3). The digital resources are most often stored and made available in the form of photographs (Chart 4). Museums try to create online communities by successfully taking advantage of social media (Chart 5 and Table 1). Unfortunately, the service of the e-museums remains largely unknown for many Polish Internet users (Chart 9 and Chart 10), and most of them believe that access to online resources should be free (Chart 6), which the author does not regard as appropriate.

The article presents selected results of the research. The author proposed a model for evaluating one feature of e-museum services, namely virtual tours. A total of 102 Internet walks were rated (Fig. 1) and the results of the assessment are presented in Table 2. After analyzing the results and the data presented in Chart 11, 12 and 13, it can be concluded that, regrettably, the initial research hypothesis about the poor quality of virtual museum tours was verified.

The validity of the complementary hypothesis raises more doubts. The respondents' opinions presented in Chart 7 and Chart 8 seem to contradict or at least undermine the assumption that virtual museums are a fully-fledged substitute for traditional museums and constitute a serious competition for them. This may be related to the user experience of respondents or the poor quality of e-services themselves. Considering the above, the complementary hypothesis cannot be verified. Nevertheless, it should be noted that there is a certain group of people for whom this digital solution seems to be the only alternative, as in the case of people with disabilities, which is yet another argument in favour of intensifying activities in this field.

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Rozwój wirtualnego muzealnictwa w Polsce

Streszczenie. Determinizm technologiczny zainicjował rewolucję społeczeństwa tworzącą podwaliny cywilizacji wiedzy. Jednym z jej kluczowych założeń jest oparcie ekonomicznego środka ciężkości na szeroko pojętych usługach. W wielu przestrzeniach nowoczesne narzędzia ICT umożliwiły wykreowanie ich cyfrowych odpowiedników. Stało się tak m.in. na styku turystyki i kultury poprzez powstanie wirtualnych muzeów. W artykule dokonano przeglądu oraz analizy poziomu rozwoju wybranych wirtualnych muzeów w Polsce. Ponadto, w odniesieniu do przeprowadzonych badań i autorskiego modelu oceny, autor podjął próbę odpowiedzi na pytania: o jakość e-usług muzealnych, ich konkurencyjność względem tradycyjnych muzeów i wreszcie o korzyści, jakie niesie ze sobą opracowanie i utrzymanie takich usług.

Słowa kluczowe: e-usługi, wirtualne muzea, wirtualny spacer