

HOW TO CREATE DIGITAL VISITOR EXPERIENCE? RESEARCH AND TESTING AS THE GROUNDS FOR DESIGNING MUSEUM'S DIGITAL PRODUCTS

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Several years ago 'Muzealnictwo' published a widely-commented paper by Alicja de Rosset and Katarzyna Zielonka *Mobile Applications in Museums: Just a Fashion or a Demand?* in which the authors described the most important challenges related to designing and releasing applications by museums. According to the data collected by the authors, in May 2016, from among 51 apps only eight were downloaded by more than 1.000 users, while as many as 26 had fewer than 100 installations.¹ Five years later, although the use of smartphones in everyday life has increased significantly,² museum applications, still eagerly created, continue not enjoying significant popularity. When analysing the download numbers in the Google Play Store, in April 2021 only two applications created by individual museums exceeded the threshold of 5.000.

If we were to ask the remaining institutions whether in the course of the works on the apps they used the methodology of working with users at the stage of research and tests, it can be assumed that highly likely these stages were entirely omitted in the majority of the designs. However, literature on the subject and praxis in the market of creating digital products blatantly demonstrate that they are actually the key stages in designing and launching new solutions for users.

This attitude is promoted by e.g., Design Thinking: a method worked out by David Kelley, Bill Moggridge, and Mike Nuttall at the Design Institute at Stanford University, a private university in Stanford, Silicon Valley, USA. Design Thinking is an approach to creating new products and services based on a thorough understanding of user problems and needs [this and below emphasizes: E.D.]. Different variants of the Design Thinking methodology, standard when creating products and services in the commercial market are slowly penetrating into the world of cultural institutions. This proven, e.g., by workshops held by the National Institute for Museums and Public Collections (NIMOZ) or training programmes: e.g., Culture Opening Workshop at the Warsaw Digital Centre. The first part of the present paper will be dedicated to analysing the user-centred designing and its major assumptions, with special emphasis laid on two designing stages: researching into user needs and testing prototype solutions; part two of the article will focus on the process of creating the new stage of the 'Experiencing Chopin' Exhibition at Warsaw's Fryderyk Chopin Museum. My intention is to share my personal experience of the Project's coordinator, and to explain how its testing stage was conducted. Furthermore, I am intending

to demonstrate how important it was to collect visitors' opinions on the existing exhibition with a focus on the 'usability' element of the applied solutions.

The validity of the processes based on user needs, namely on the needs of museum visitors when creating products (traditional and multi-media exhibitions, websites, applications) as well as services (educational programmes, communication strategies, and events) has already been tackled in 'Muzealnictwo' by Magdalena Laine-Zamojska and Agnieszka Mróz,³ in *Design Thinking in Culture* by Agnieszka Kaim, or by the authors of the publication *#Effective. On Service Designing*.⁴ Cultural institutions have shared their experience with implemented digital projects in the publication *Digitized Heritage* (2016). There Alicja Sułkowska-Kądziołka, member of the team working on the Virtual Museums of Lesser Poland Repository, writes as follows: *Today we already know that in technological projects it is essential to permanently monitor the addressees. This means analysing their needs and expectations with respect to the created portal (particularly at the initial designing stage) and testing, when we put users before our portal (or its prototype) and e.g., check how the users navigate it. It allows us to see what is intuitional for them, and which is just the contrary. In the course of such tests one can verify how even the best of ideas can be undermined by making them excessively bizarre or complicated.*⁵

End user needs as designing basis

The basis for Design Thinking is analysing users: their needs and complaints, mapping their experience connected with

the use of the product and services. This attitude does not only imply the necessity to research into those problems and needs, but also to experiment and test hypotheses. They are tested by building prototypes and collecting user feedback. Working with this method assumes definite phases in the designing process. The first stage is to empathise, namely to become better acquainted with the problem, analyse user context, explore and discover as well as to directly research into user needs. Subsequently comes the second stage: to define the design challenge on the grounds of the identified problems. The third stage which follows is ideating: generating ideas and coming up with potential solutions. Based on the ideas conceived at this stage, next comes the stage of building prototypes which are tested in the course of stage five.⁶ The results of the testing stage should lead to introducing improvements, corrections, changes, and modification. Although not securing success, such an attitude minimizes spectacular failures resulting from the divergencies between the vision of the client and designers and the actual user needs.

Importantly, the methods of research used in Design Thinking significantly differ from those applied when studying museum visitors, despite both stemming in their basis from ethnography. User research and tests are characterised by smaller samples, but a significant role of observation. Evaluation in the design process has a practical purpose: to amass and sum up information that can serve designers in the later process. For this reason tests and research are faster and more subjective, conducted on a smaller group of participants and without conditions' control, also more focused on usability-related questions.



1. Inside the Fryderyk Chopin Museum in Warsaw

What does a usable solution mean?

What is usability? In Jacob Nielsen's words: *usability is a quality attribute that assesses how easy user interfaces are to use*. More precisely, it refers to how quickly people can learn how to use something, how effective they are using a product or a service, how many errors users make using it, and how much users enjoy using it. If users are unable or uneager to use a certain function, says Nielsen, it might as well not exist at all.⁷

What are the most frequent user problems? These are as follows:

1. behaviours that impede task completion;
2. behaviours that 'divert' users;
3. frustration related to navigation;
4. not noticing something that should be noted;
5. activities that move us away from a correct task completion;
6. excessively time-consuming activities;
7. erroneous interpretation of a content part.⁸

How do we test usability of built solutions?

Tests are the method to evaluate usability of the interface of the designed product. They can be interfaces of applications, websites, tablets, multimedia screens, but also of a leaflet or poster layout design. Tests serve to identify all the possible problems related to usability which can have impact on the overall user impression related to e.g., a newly-designed website. Using the example of a www site, the test stage in designing is to check the clarity of the information architecture, to understand the likely contexts and reasons for which users visit the site, to evaluate the visual design of respective sections of the site and layout, as well as to understand how users experience the overall look and functionality of the new site.

When do we test?

Tests can be conducted at any stage: initial evaluation of the idea, paper prototype, clickable prototype, pilot program, finally the operating product or launched service. Agnieszka Kaim in her publication *Design Thinking in Culture* states straightforwardly that *testing is a stage in designing*.⁹ Therefore, a survey is not enough: interview and observation of users of a given solution is essential in the further work on it. Resuming the example of building a website, it is recommendable to conduct first tests with the interactive HTML service prototype. The second verification round can already be conducted on a fully operational service version, as was the case when the Tate Museum's website was created in 2012.¹⁰

Usability testing is usually task-oriented, meaning that a user is requested to complete many tasks under the circumstances most resembling the situation of using a product or service on a daily basis. As stated by Iga Mościchowska and Barbara Rogoś-Turek in the book *Testing as Basis of User Experience Design*, tests are not to provide a summative evaluation meant to obtain subjective assessment and quantitative analysis, but a formative evaluation focused first of all on problem identification.¹¹ *Usability tests are the best*

way of understanding how real users perceive the system and how they use it. They constitute a source of knowledge connected with an interactive product essential to verify and improve solutions,¹² say the authors.

The advantage of usability tests is their informal character. Testing can be carried out in almost any conditions: labs are not required, and neither are specialized devices or technical protocols. Testing of a product or service on an end user group is carried out frequently (optimally at every designing stage), yet on a relatively small user group. It is most effective on a group of five to ten individuals in every target group. Research demonstrates that testing with five users gives us the knowledge of 85% usability problems in a given solution.¹³ Even such a limited number of testers can point to potential problems and usage errors. Tests can be easily analysed: the key in their interpretation is to identify the most frequent problems, the tasks which are challenging, and to relate these to user types. The testing scenario should take into consideration the overall testing purpose, identification of respective targets and of the target group, list of users' tasks, number of tested users, and the evaluation and observation form.

Several task types applied for usability testing of the created solutions can be distinguished: e.g., precise tasks, general and free ones, used in response to the testing purpose. If the set goal is to test a definite key functionality of a product, then closed tasks consisting in e.g., the return of an unused ticket to an exhibition in a new booking system will be an appropriate means for its testing. However, if we want to get to know the general user experience of using the product, observe users' natural reactions or emotions that accompany the use, we will then ask the user to purchase a ticket on the date they choose or to freely explore the interface, which is even a better method. Another testing form will be the think aloud protocol, namely when the tester verbalizes his/her own thinking process and comments on respective actions in the application. Thanks to it we can understand step by step the thinking process of the tested participant, and verify whether it coincides with the user pathway designed by the authors. Concept tests or coaching method can be useful at the initial stage of the solution when the prototypes are evaluated, i.e., when the testing goal is to explore. In that situation the user is encouraged to ask questions related to the application itself and to dialogue with the tester, and even to come up with his/her ideas. The goal is to discover what information users find missing in order to operate the given application effectively. Performance testing and comparative testing serve the assessment of product's usability with the application of numerical metrics such as performance time, number of steps needed to complete a task, number of applied functionalities, or a questionnaire with an appropriately prepared scale, e.g. System Usability Scale (SUS).¹⁴

In the course of usability testing the role of the tester cannot be overestimated. The test evaluator's task is to primarily analyse observations, not the declarations of tested users, paying attention to their emotions and non-verbal communication, as well as to categorize problems, ranking them in order of importance. In all the acquired observations in the testing common elements and models are sought: they allow to formulate the given problem's causes. The analysis

of problems and of usability testing conclusions is usually of a qualitative character, and leads to creating a list of recommendations meant to eliminate defects and problems.

CASE STUDY: FRYDERYK CHOPIN MUSEUM IN WARSAW

Identifying needs and working out assumptions

Opened on 1 March 2010, the permanent exhibition at the Chopin Museum was, immediately following that at the Warsaw Rising Museum, one of the first multimedia displays in Poland. Covering 890 sq m of display space, it has 12 thematic islands located on four levels of the Ostrogski Palace located in Warsaw's Tamka Street. Ten years of the Museum's operations revealed the need to change the main display. On the one hand, new needs of visitors and problems with the multimedia use were signalled, on the other trends in exhibiting had changed, contrasting with the designs from a decade before. Today museum visitors come to a museum with the most modern technological solutions in their own pocket. A multimedia display must thus be adequate to the needs of contemporary visitors, their increasing expectations as well as technological and digital competences. Therefore, in order to maintain the image of a modern museum, the decision was made to thoroughly refurbish the permanent display. The layout was designed by the Rytm Digital Studio, while the software implemented by the Huncwot Studio. On part of the Museum the museum team¹⁵ headed by Ewa Drygalska was involved.

Technological reasons: opening up of a closed system

Among the multimedia presentations there were many which were faulty and required a thorough modernization of the technological infrastructure. Additionally, the Museum needed a possibility to fully manage the contents and introduce changes in the displays. It was thus necessary to open up the content system, up till then closed, which had effectively impeded easy and fast content editing by the Museum.

Technological reasons: touch

After a decade it turned out that once generally promoted RFID card technology, used to start presentations and to choose the language version, was outdated. The general application of Touch User Interface, TUI, in mobile phones, tablets, in public places in e.g., self-service cash desks, even in household appliances, caused that the use of cards had become unintuitive for visitors who expected the start of the presentation by touching screens.

Factual reasons: new resources

At the threshold of its activity the Chopin Museum did not boast a fully digitized collection, additionally not of such high quality that is in today's perspective standard for

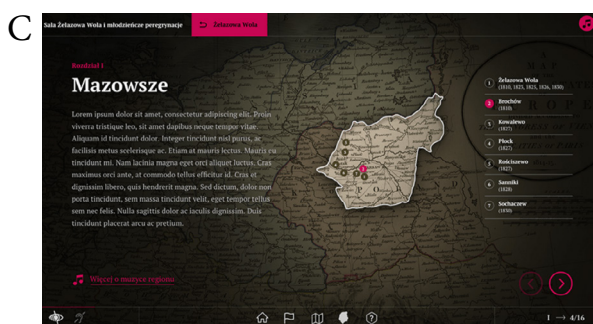
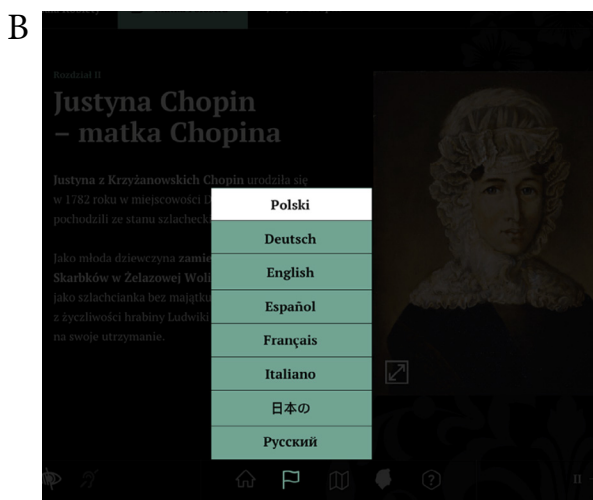
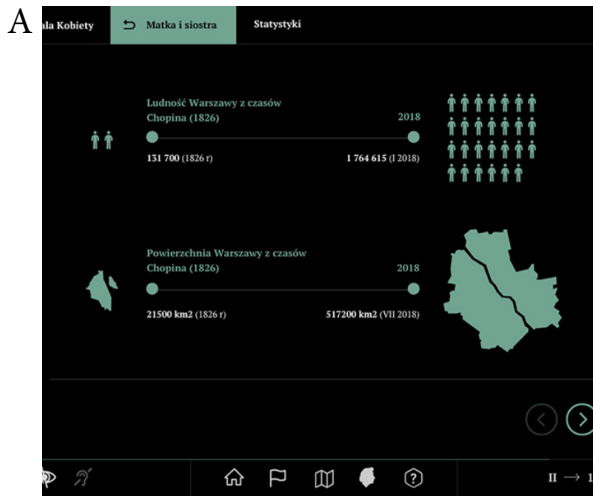
publication and sharing digital images. Many of the images, prints, scans of letters or of note autographs did not allow their enlargement or spotting details. Therefore, when working on the new multimedia presentations' scenarios we laid emphasis on showing the highest quality digital images from our own collection, but also on acquiring reproductions from other institutions that had undergone digitizing around the same period of time. Furthermore, since 2010 on the one hand significant purchases for the collection have been made, thus new Museum acquisitions stood a chance of being displayed; on the other, thanks to researchers the knowledge of Chopin and the period has extended. So the goal was to present the latest state of knowledge to visitors and to use the digital collection.

Aesthetical reasons: return to simplicity

The visual design of user interfaces drastically changed over the decade since the Museum's opening. The original design did no longer match any standards and identifiable visual elements of the interfaces used on a daily basis in mobile phones and websites, owing to which navigating and moving across the multimedia Museum presentations had become very challenging. What is more, the visual design strongly contrasted with the current trends in designing digital content. Content architecture, today regarded as intuitive, is created as a net organizing contents in sections, columns, and fields, the element missing in the Museum presentations. Neither were the presentation colours sufficiently contrasting, while the visual contents, namely the eye-catching images were not sufficiently accentuated. The presentations were evaluated as not sufficiently attractive visually and obsolete.

Researching into visitor experience

Back in 2010 the presentations were conceived as multimedia combinations of text, music, iconography, videos, and also spoken narrative. However, the research conducted for many years into opinions and evaluations pointed to problems visitors had with choosing the content. They expected better prioritized information pieces, firstly a choice between a short and a long version. In other words, when they were not sufficiently interested in the topic, they did not wish to go through the whole presentation lasting for a dozen minutes or so to reach the basic facts. They pointed to the need to have materials presented in a more condensed form, accentuating the most important pieces of information, with the option to 'go deeper' in each case. The research showed the desire to become acquainted with contents in briefer, more easily comprehensible formats. What turned out to be a barrier to some visitors was the presentation language: at moments too difficult, jargonistic, or academic. The expectation was for more anecdotic communication, showing more 'spice', dealing preferably with personal, not encyclopaedic motifs. Additionally, the concept of an 'open museum' that was the slogan with the opening of the Chopin Museum, permitting free selection of visiting routes without any prior marked out visiting pathways, did not satisfy some of the public. They had expected more ordered and clear options of moving across the display.



2. (A-C) Design of new multimedia presentations at the Digital Rhythm Studio/screenshots

The assumptions: modern simplicity

When approaching the task of updating the multimedia display of the Chopin Museum, the project's boundary conditions had to be defined, namely the basic assumptions to be followed in the works on the new visual layout. The following was decided: firstly, multimedia presentations were to apply simple technological solutions that would stand the test of time and would not become obsolete too

quickly; secondly, that these solutions should occupy the background versus museum objects, music, and space experiencing at the foreground, meaning that a visitor should not 'notice' technology. Thirdly, new technological solutions should facilitate and simplify visiting experience. Fourthly, the structure of the presentation should be clear and transparent, however varied.

The challenge of creating new presentations was formulated on several levels. New multimedia contents could not excessively depart from the genuine scenario assumptions, since they were strictly connected with the whole exhibition. The main goal was to reduce the content, eliminate reiterated fragments and images, simplify the language and the message, as well as to make narration structures more attractive. Hence the idea of module structures composed of various block types which can be assembled in different variants. The new interface graphic layout should take into account the principles of designing useful interfaces. The presentations should not oblige visitors to reflect, thus following the principle 'Don't make me think' formulated by Steve Krug, functionality pioneer and consultant. What was found useful were also ten 'usability heuristics' by Jacob Nielsen suggesting the following:

1. Show visitor the current presentation status, e.g., in the form of a progress bar, which will provide users with immediate feedback at what point of the presentation they are, how much content they have covered, and how much is left to the end of the presentation, so that they can estimate their time and cognitive resources.
2. In the presentation speak your user's language, applying generally known words, phrases, and concepts.
3. Give visitors full control over the presentation navigating, choice of content and language.
4. Keep up presentation consistency throughout the whole Museum, even when using different content formats.
5. Prevent user errors by creating an error-free and intuitive system.
6. Give visitors freedom of choice, do not force them to memorize instructions. All the unexplored information at the given moment should be visible on the screen at all time.
7. Secure flexibility and efficiency of use, meaning that the interface should be sophisticated enough to cater both to inexperienced and experienced users.
8. Keep the visual design aesthetic and minimalist, faithful to the principle 'less is more', since a more modest layout makes the interface clearer, it does not take excessive toll on eyesight, and shortens the time of searching for the necessary content.
9. Help users effectively recover from errors.
10. Provide the interface with assistance, e.g. explaining icons and clicks.¹⁶

Usability testing of multimedia presentations

Usability testing in the course of implementing the presentation system was conducted. It involved 12 individuals aged



3. (A-E) Public visiting the main exhibition at the Fryderyk Chopin Museum in Warsaw

(Photos: 1 – M. Czechowicz / NIFC; 3 A-E) – J. Mozolewski / NIFC)

17 to 60. Among them there were single visitors, families, and couples. Each test was carried out within the display as yet unopened to the public, in the absence of other visitors, and lasted for about 60 to 90 minutes.

The testing goal was to first of all check if the new navigation system in the presentations was intuitive and easy to operate for visitors. The question was whether visitors, regardless of their age and technological competences, were able to move through the presentation content: to start it, look through the menu, look through different sections and return to the menu. Secondly, the testing was to evaluate the degree to which the presentations' functionalities were used, so here the question posed was whether all the system functions, such as music player, image enlargement, timeline, biography, additional information, etc., were visible to

the user and used. Thirdly, the tests were to demonstrate how visitors evaluated presentation aesthetic and the new factual content, in other words, whether the presentation language was comprehensible, clear, and the added material visually attractive.

The testing was conducted applying three methods: user observation, task assignment test, and evaluative survey¹⁷ (See Annex). In the tests attempts were made to check the visibility of elements, means and problems with navigation. User observation was conducted in harmony with the priority prepared observation protocol identifying the most important presentation's functionalities, such as presentation navigation means and additional functionalities, which were not essential to be used. At first, the test participants were asked to freely use the presentation. Later, in more specific

assignments they were requested to perform a definite activity, such as e.g., photo enlargement or starting the music player. Gradually, after discovering problems with usage, think aloud protocols were involved so that the difficulty in completing tasks could be better identified.

The testing showed some key navigation problems (e.g., unintuitive icon symbols or icons of return to the menu), which had to be modified and re-designed; however, what proved the greatest technological difficulty was the screen touch foil. The interesting conclusion from the research was the observation that among senior individuals (over 50) technical difficulties (multiple clicking, poor screen sensitivity) and poor understanding of the navigation as well as of some functions inspired greater discomfort and frustration. They had expected icons compatible with the ones they knew from their smartphones and a 'smaller thinking burden' in using the navigation. Usability testing allowed to precisely define which elements of the UX design required improvement and re-thinking, and pointed to various visitor needs. The results of the presentation's technological evaluation also allowed to better calibrate parameters of the touch foils.

Discussion

Despite the benefits described in the first part of the paper, let us signal that testing also has some limitations. As stated by the authors of the *Handbook of Usability Testing: testing is not a guarantee of success; neither does it prove that the product is usable. Even the most rigorous tests cannot guarantee that the product will be usable at the moment of its launch.*¹⁸ They point to some essential reasons for that failure, listing artificiality of the situation for testing participants, even if tests are conducted 'in the field'. Since the very circumstances of the testing affect its results, most often excessively adding to its results, e.g. the declared satisfaction with the use. Importantly, usability testing is not representative, and sometimes it is extremely difficult to recruit ideal testing participants for all the planned target users. Additionally, an inexperienced researcher may find it difficult to analyse the results, particularly to separate observation

from tester declarations, often dependent on social conventions or unwillingness to formulate a negative assessment. Testing is not always the optimal evaluation technique and the best means to improve the created solutions. In some cases what is more effective, cost-, time-, and precision-wise, is to conduct an expert evaluation, particularly at the early stages of product development. However, despite all those limitations, usability testing demonstrates potential problems and means to solve them. In any case, researchers emphasise that testing is better than non-testing.

In the process of designing for museums, too little time is dedicated to the research phase. Museums and cultural institutions regularly carry out research and evaluation by their researchers, they conduct visitor segmentation and exhibition evaluation. However, rarely do designers take these into consideration. An example here being the data claiming that the majority of the public visit museums with companions; meanwhile, displays and multimedia are most frequently designed for individual users, this not permitting a visit together and spending time together. And it should be research and testing that form the basis of designing and mounting exhibitions. The testing should be conducted in the conditions most approximating natural ones, within the display environment, amidst actual visitors. The testing stage should be obligatory following each phase (interface designing, content creation), and not merely following the implementation phase. Prior to testing, the visual design and interface design are merely working material that will and should change depending on the feedback received from the target user group. Skipping testing will yield errors, particularly in functionality and user satisfaction: the errors difficult to correct at the final design stage when the correction options are limited. It is recommendable to consider the process of mounting and creating an exhibition as an open process, not a closed project. Launching a new exhibition should merely be the beginning, the starting point at which we start evaluation: studying and testing the factual, technological, and functional layers of the implemented ideas. Feedback on such evaluations should provide grounds for preparing yet another iteration for our creative and technological partner.

Abstract: An overview of literature on and state of knowledge of the application of user-centred design methodologies are discussed. Based on the experience with creating digital products and multi-media exhibitions, the Author claims that the role of users/visitor experience testing in the process of designing and implementing technological

projects is of key importance. Using the example of the work on the new version of the multimedia display titled 'Experiencing Chopin' (2020) at Warsaw's Fryderyk Chopin Museum, the paper discusses means of adaptation of the most popular research and evaluation techniques in user-centred testing in the museum context.

Keywords: testing, user experience testing, usability tests, designing, Design Thinking, visitor experience testing, UX.

Endnotes

- ¹ A. de Rosset, K. Zielonka, *Aplikacje mobilne w muzeach, moda czy potrzeba?* [Mobile Applications in Museums: Just a Fashion or a Demand?], 'Muzealnictwo' 2016, No. 57, pp. 236-244.
- ² M. Mikowska, A. Skalna, K. Siviński, *Polska Jest. Mobi* [Poland. Is. Mobi], 2018, <https://www.pzpm.org.pl> [Accessed: 26.04.2021].
- ³ M. Laine-Zamojska, A. Mróz, *Odbiorcy w procesie projektowania cyfrowej usługi dla muzeów* [The Role of the Audience in Designing Digital Services for Museums], 'Muzealnictwo' 2016, No. 57, pp. 166-178.
- ⁴ Conference proceedings, *#Daje efekt. O projektowaniu usług* [#Effective. On Service Designing], 2015, http://www.mazowieckieobserwatorium.pl/media/_mik/files/2421/publikacijakonferencjadajeeffekt.pdf [Accessed: 15 April 2021].

- ⁵ *Dziedzictwo w cyfrze. Zbiór studiów przypadku wdrażania nowych technologii w instytucjach kultury* [Digitized Heritage. A Set of Case Studies of Implementing New Technologies in Cultural Institutions], Ł. Mażnica (ed.), Fundacja Warsztat Innowacji Społecznych, Kraków 2016, p. 41.
- ⁶ R. Curedale, *Design Thinking Process & Methods*, Design Community College, Topanga 2019.
- ⁷ J. Nielsen, *Usability 101: Introduction to Usability*, <https://www.nngroup.com/articles/usability-101-introduction-to-usability/>
- ⁸ T. Tullis, B. Albert, *Measuring the User Experience. Collecting, Analyzing, and Presenting Usability Metrics*, Morgan Kaufmann Publishers Inc., San Francisco 2013, online version, p. 220.
- ⁹ A. Kaim, *Design Thinking w kulturze. Myślenie projektowe krok po kroku* [Design Thinking in Culture. Designing Thinking Step by Step], Agnieszka Kaim/www.agnieszkakaim.eu, Gdynia 2019, p. 73.
- ¹⁰ T. Tasich, E. Villaespesa, *Meeting the Real User: Evaluating the Usability of Tate's Website*, in: *Museums and the Web 2013*, N. Proctor, R. Cherry (ed), Silver Spring, MD: Museums and the Web, 2013, <https://mw2013.museumsandtheweb.com/paper/meeting-the-real-user-evaluating-the-usability-of-tates-website/>
- ¹¹ I. Mościchowska, B. Rogoś-Turek, *Badania jako podstawa projektowania User Experience* [Research as Basis of UX Design], PWN, Warszawa 2018, p. 199.
- ¹² *Ibid.*, p. 202.
- ¹³ J. Nielsen, *Why You Only Need to Test with 5 Users*, <https://www.nngroup.com/articles/why-you-only-need-to-test-with-5users/#:~:text=In%20testing%20multiple%20groups%20of,%20people%20in%20each%20group>
- ¹⁴ J. Brooke, *SUS-A quick and dirty usability scale*, in: *Usability Evaluation in Industry*, P.W. Jordan, B. Thomas, B.A. Weerdmeester, I.L. McClellan (ed.), Taylor & Francis, London 1996, pp. 189-194.
- ¹⁵ The team was composed of: Marta Tabakiernik, Łukasz Kaczmarowski, Mariola Lekszycka, Ewa Bogula, Ewa Chamczyk, Justyna Stabryn-Kłos, Piotr Wojciechowski, Marita Alban Juarez.
- ¹⁶ J. Nielsen, *Usability Engineering*, Academic Press, San Diego 1993.
- ¹⁷ The evaluation survey has been attached as annex to this paper.
- ¹⁸ J. Rubin, D. Chisnell, *Handbook of Usability Testing, Second Edition: How to Plan, Design, and Conduct Effective Tests*, John Wiley & Sons Inc, Indianapolis 2008, p. 25.

Bibliography

- Brooke J., *SUS-A quick and dirty usability scale*, w: *Usability Evaluation in Industry*, P.W. Jordan, B. Thomas, B.A. Weerdmeester, I.L. McClellan (ed.), Taylor & Francis, London 1996.
- Curedale R., *Design Thinking Process & Methods*, Design Community College, Topanga 2019.
- Dziedzictwo w cyfrze. Zbiór studiów przypadku wdrażania nowych technologii w instytucjach kultury* [Digitized Heritage. A Set of Case Studies of Implementing New Technologies in Cultural Institutions], Ł. Mażnica (ed.), Fundacja Warsztat Innowacji Społecznych, Kraków 2016.
- Kaim A., *Design Thinking w kulturze. Myślenie projektowe krok po kroku* [Design Thinking in Culture. Designing Thinking Step by Step], Agnieszka Kaim/ www.agnieszkakaim.eu, Gdynia 2019.
- Laine-Zamojska M., Mróz A., *Odbiorcy w procesie projektowania cyfrowej usługi dla muzeów* [The Role of the Audience in Designing Digital Services for Museums], „Muzealnictwo” 2016, nr 57.
- Mikowska M., Skalna A., Siwiński K., *Polska.Jest.Mobi* [Poland. Is. Mobil], 2018, <https://www.pzpm.org.pl/>
- Mościchowska I., Rogoś-Turek B., *Badania jako podstawa projektowania User Experience* [Research as Basis of UX Design], PWN, Warszawa 2018.
- Nielsen J., *Usability Engineering*, Academic Press, San Diego 1993.
- Nielsen J., *Why You Only Need to Test with 5 Users*, <https://www.nngroup.com/articles/why-you-only-need-to-test-with-5users/#:~:text=In%20testing%20multiple%20groups%20of,%20people%20in%20each%20group>
- Nielsen J., *Usability 101: Introduction to Usability*, <https://www.nngroup.com/articles/usability-101-introduction-to-usability/>
- de Rosset A., Zielonka K., *Aplikacje mobilne w muzeach, moda czy potrzeba?* [Mobile Applications in Museums: Just a Fashion or a Demand?], „Muzealnictwo” 2016, No. 57.
- Rubin J., Chisnell D., *Handbook of Usability Testing, Second Edition: How to Plan, Design, and Conduct Effective Tests*, John Wiley & Sons Inc, Indianapolis 2008.
- Tasich T., Villaespesa E., *Meeting the Real User: Evaluating the Usability of Tate's Website*, in: *Museums and the Web 2013*, N. Proctor, R. Cherry (ed), Silver Spring, MD: Museums and the Web, 2013, <https://mw2013.museumsandtheweb.com/paper/meeting-the-real-user-evaluating-the-usability-of-tates-website/>
- Tullis T., Albert B., *Measuring the User Experience. Collecting, Analyzing, and Presenting Usability Metrics*, Morgan Kaufmann Publishers Inc., San Francisco 2013, online version.
- Conference proceedings, *#Daje efekt. O projektowaniu usług* [Effective. On Service Designing], 2015, http://www.mazowieckieobserwatorium.pl/media/_mik/files/2421/publikacjakonferencjadajeefekt.pdf

ANNEX

EVALUATION SURVEY

Dear Tester,

We would like to know your opinion on and impression of the Exhibition. In each question circle one number 1–5, where 1 means 'I entirely disagree', while 5 stands for 'I fully agree'.

We appreciate your time!

Date:

Name:

Age:

1. Using the multi-media presentation was easy and intuitive

I entirely disagree 1 2 3 4 5 I fully agree

2. Using the presentation was very smooth and dynamic

I entirely disagree 1 2 3 4 5 I fully agree

3. Using the presentation was frustrating and energy-consuming

I entirely disagree 1 2 3 4 5 I fully agree

4. I had difficulties moving across the presentation

I entirely disagree 1 2 3 4 5 I fully agree

5. I could feel I controlled the multimedia presentation

I entirely disagree 1 2 3 4 5 I fully agree

6. Learning to use the multimedia presentation was easy

I entirely disagree 1 2 3 4 5 I fully agree

7. Identifying the icons and their functionalities was hard

I entirely disagree 1 2 3 4 5 I fully agree

8. Multimedia presentations were complicated to use

I entirely disagree 1 2 3 4 5 I fully agree

9. It was hard to choose the option I wanted

I entirely disagree 1 2 3 4 5 I fully agree

10. The information given in the multimedia presentation was too long

I entirely disagree 1 2 3 4 5 I fully agree

11. There were too many images in the presentations, too much content

I entirely disagree 1 2 3 4 5 I fully agree

12. The language of the presentation was simple and comprehensible

I entirely disagree 1 2 3 4 5 I fully agree

13. I liked the aesthetic of the presentation

I entirely disagree 1 2 3 4 5 I fully agree

14. The presentations could have been shorter

I entirely disagree 1 2 3 4 5 I fully agree

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Word count: 4886; **Tables:** –; **Figures:** –; **References:** 18

Received: 04.2021; **Reviewed:** 05.2021; **Accepted:** 05.2021; **Published:** 06.2021

DOI: 10.5604/01.3001.0014.9359

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Competing interests: Authors have declared that no competing interest exists.

Cite this article as: Drygalska E.; JAK TWORZYĆ CYFROWE DOŚWIADCZENIA ZWIEDZAJĄCYCH? BADANIA I TESTOWANIE JAKO PODSTAWA PROJEKTOWANIA CYFROWYCH PRODUKTÓW W MUZEUM. *Muz.*, 2021(62): 100-110

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