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Attractiveness of Virtual Exhibitions in Cultural Institutions in the Post-pandemic Context: A Case Study

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Abstract

The paper presents some metrics and statistical figures regarding the evolution of the number of users, sessions and accesses by country and device category (desktop, smartphone, tablet) for a virtual exhibition created at the Romanian Academy Library. We aim to reveal the changes in the behavior of visitors in the interval between November 2018 and May 2023. The investigated data spans before and after COVID-19 pandemic. Moreover, we aim to understand the seasonal behavior of visitors and changes that have been imposed by lockdowns. The virtual exhibition was created as a web application and the data analyzed was collected using Google Analytics platform. To understand trends, graphical representations are used. The graphics presented in the paper were created with the Power BI tool and Google Analytics platform. Based on the data analyzed, we identify interesting insights regarding visitors' behavior that can be used to define a metric related to the attractiveness of the virtual exhibition, in order to enhance the content in the future and to deliver improved personalized content to the visitors.

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Keywords: virtual exhibition, statistics, cultural institution, attractiveness.

1. Introduction

Virtual exhibitions can be viewed as part of what is called at present “Museum at Home” movement [1]. Since the early days of digital transformation of cultural institutions [2] several aspects of such processes have been studied, for example: the contribution of creating a knowledge-based society [3], defining a digital business model in the cultural

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heritage context [4], mitigating the impact of pandemic on cultural life [7], defining a digital humanism [5], [6] or automatic design of virtual exhibitions [13].

In the paper, the facet concerning the usage of technical means is addressed. In addition to identifying visitor behavior patterns inside virtual exhibitions, in order to provide them with personalized content, the paper emphasizes the importance of promoting and valorizing historical and cultural collections from cultural institutions, including art Galleries, Libraries, Archives, and Museums (GLAMs), using the newest Information and Communication Technologies (ICTs) [12]. The purpose of this paper is to draw attention to the role played by contemporary ICTs in the cultural sector as well as the benefits of innovative instruments like virtual exhibitions for gaining access to, publicizing, and valuing cultural resources [5].

Google Analytics is a powerful tool to collect data and understand consumers/visitors or users' behavior and identify ways to attract them. Moreover, the COVID-19 pandemic heavily influenced the economies, markets and behavior of webpage users [9], [10], [14]. Analyzing the Google Analytics data from November 2018 to May 2023, we aim to identify the patterns and effects that COVID-19 pandemic and associated lockdowns had on the GLAMs' visitors [11]. The trends and evolution of visitors are depicted using graphical representations.

2. Statistics regarding the number of users, sessions and browsers

Certain metrics need to be assessed by gathering data over a specified time period in order to study user behavior in a virtual exhibition. The user activity inside the *Ferdinand I* (<http://movio.biblacad.ro/FERDINAND>) virtual exhibition was evaluated by looking at the Google Analytics indications, which provided a summary for the years 2018 through 2023.

The Figure 1 below shows the number of users, the number of sessions and the number of new users per country for *Ferdinand I* virtual exhibition in the period 2018 – 2023. As can be seen, the number of sessions is double the number of users, that means each user accessed almost twice the virtual exhibition. Also, the number of new users is very representative, which represents another indicator that shows the attractiveness of the virtual exhibition.

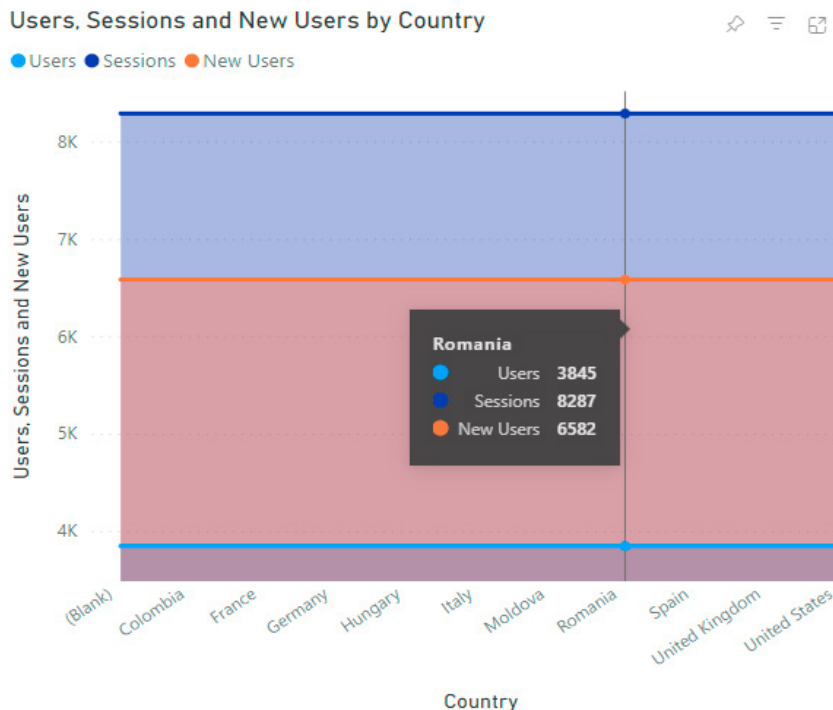


Fig. 1. The number of users, sessions and new users by country

In terms of the correlation between the evolution of number of users and the number of sessions, on average, when the number of users increases, also the number of sessions increases.

According to Figure 2, the most used browser to access the virtual exhibition is Google Chrome with a percentage of 65%. The second browser in the hierarchy is Safari, which means that 12% from total users are using Apple devices.

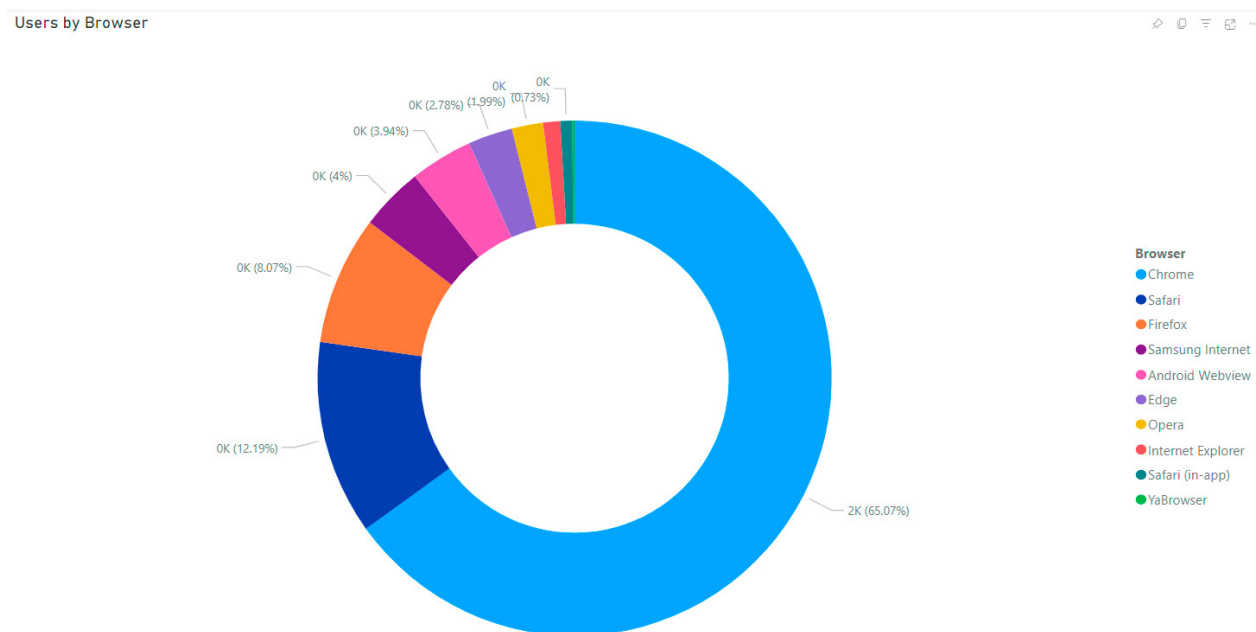


Fig. 2. The number of users by browser used

3. Statistics regarding the device category, country and users' behavior

Figure 3 shows the number of users, new users and sessions per device category in the period 1st February – 30th April 2023. As we can see, the most accesses were made on desktop computers, after that on smartphones and a small number of visitors used their tablets.

Device Category ?	Acquisition		
	Users ?	New Users ?	Sessions ?
	257 % of Total: 100.00% (257)	257 % of Total: 100.00% (257)	282 % of Total: 100.00% (282)
1. desktop	151 (58.75%)	151 (58.75%)	165 (58.51%)
2. mobile	99 (38.52%)	99 (38.52%)	110 (39.01%)
3. tablet	7 (2.72%)	7 (2.72%)	7 (2.48%)

Fig. 3. The number of users and sessions by device category

Figure 4 displays the percentages regarding the evolution of accesses on desktop, mobile and tablet in the period 1st February – 30th April 2023. As also presented in Figure 3, the highest number of accesses were made on desktop

computers, but the graphic shows also that in the last 90 days the number of accesses on desktops increased and the number of accesses on mobile devices decreased.

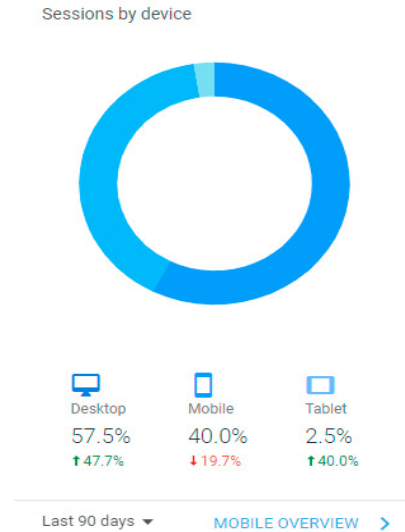


Fig. 4. The evolution of accesses on desktop, mobile and tablet

In Figure 5 below, there are presented the statistics in terms of number of users, new users and sessions per country for a period of 90 days (1st February – 30th April 2023). According to Fig. 5, the most representative countries are Romania and United States.

Country ?	Acquisition		
	Users ? ↓	New Users ?	Sessions ?
	257 % of Total: 100.00% (257)	257 % of Total: 100.00% (257)	282 % of Total: 100.00% (282)
1. Romania	148 (57.59%)	148 (57.59%)	173 (61.35%)
2. United States	56 (21.79%)	56 (21.79%)	56 (19.86%)
3. Ireland	18 (7.00%)	18 (7.00%)	18 (6.38%)
4. Sweden	13 (5.06%)	13 (5.06%)	13 (4.61%)
5. Germany	5 (1.95%)	5 (1.95%)	5 (1.77%)
6. Moldova	4 (1.56%)	4 (1.56%)	4 (1.42%)
7. Brazil	3 (1.17%)	3 (1.17%)	3 (1.06%)
8. Austria	2 (0.78%)	2 (0.78%)	2 (0.71%)
9. Italy	2 (0.78%)	2 (0.78%)	2 (0.71%)
0. Spain	1 (0.39%)	1 (0.39%)	1 (0.35%)

Fig. 5. The number of users, new users and sessions per country

Figure 6 below describes the users' behavior flow in the virtual exhibition for a period of 90 days (1st February – 30th April 2023). The segments taken into consideration were the operating system of the device from which the exhibition was accessed and the evolution of mobile and tablet traffic. According to Figure 6, 41% of the sessions were made on mobile devices and the highest number of sessions were made from Android operating system devices.

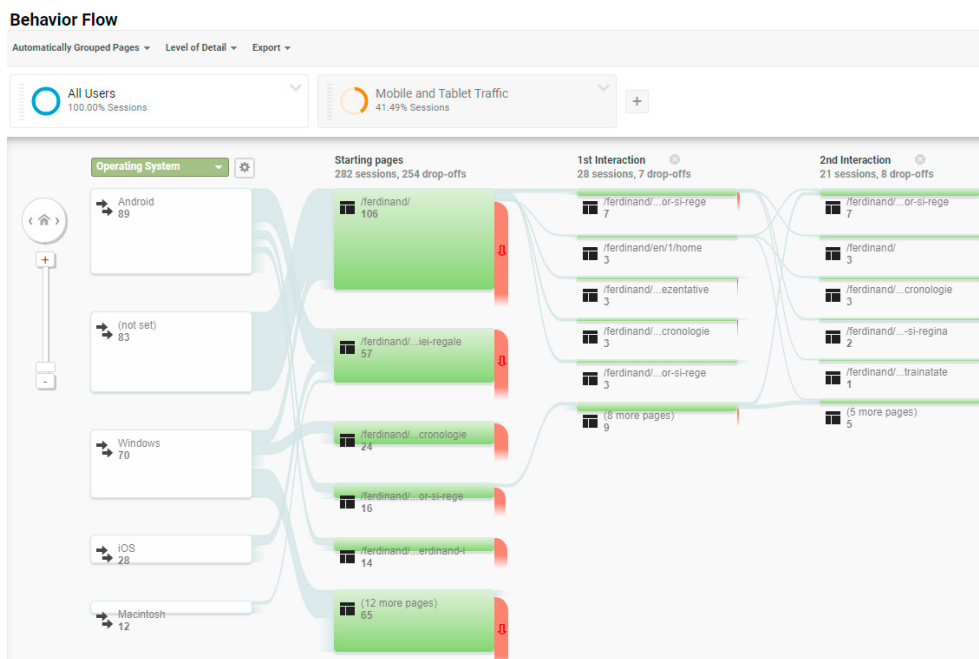


Fig. 6. The behavior flow and the evolution of mobile and tablet traffic

Interesting insights can be obtained from the users' graphics that describe the total number of users (visitors) that accessed the website according to the Google Analytics data. The evolution of users from November 2018 until 2023 is displayed in Fig. 7. One can notice that twice the number of visitors exceeded 30 visitors per day and these days were both in 2019. Only three spikes (between 20 and 30 visitors) were recorded in the mentioned interval, and they took place in November 2018, July 2019 and December 2020. The last one was on the 1st of December - the national Romanian day during the COVID-19 pandemic and therefore the coincidence is not accidental. There is also a similar spike of 15 visitors on the 1st of December 2021. Considering the role of *Ferdinand I* in the history of Romania, we notice that the webpage content is correlated to the number of visitors on representative days.

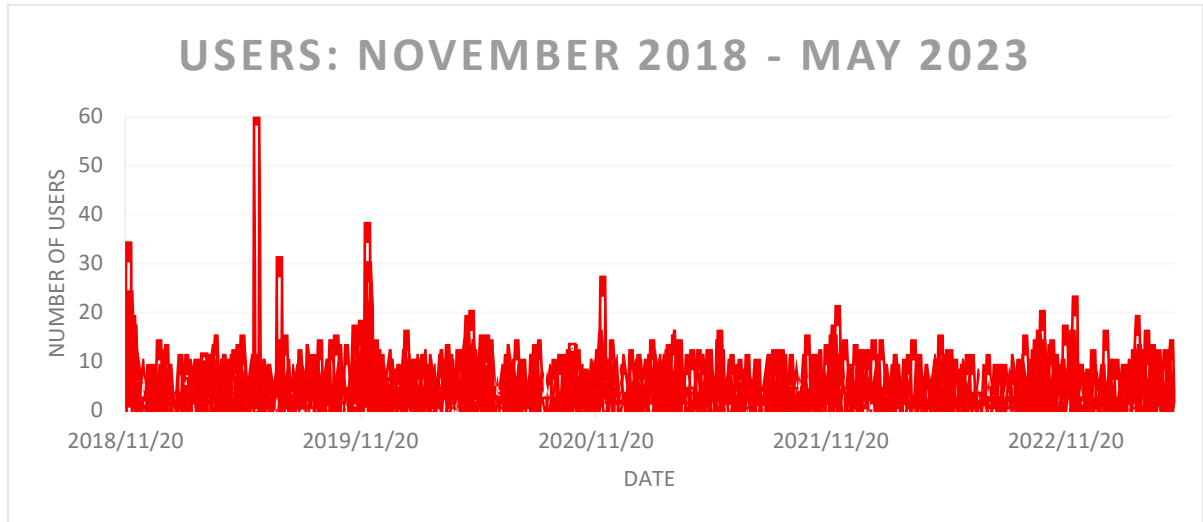


Fig. 7. Users' evolution from November 2018 to May 2023

The number of users is also showcased at the year and month level (as in Fig. 8), extracting valuable insights regarding their evolution in time. First, one can notice that the number of visitors was slightly bigger before COVID-19 pandemic. In 2022, the number of visitors decreased from 1375 to 934. It is also interesting to notice that the summer months attracted less visitors. There is a clear seasonal trend as most visitors accessed the webpage during colder spring and autumn months.

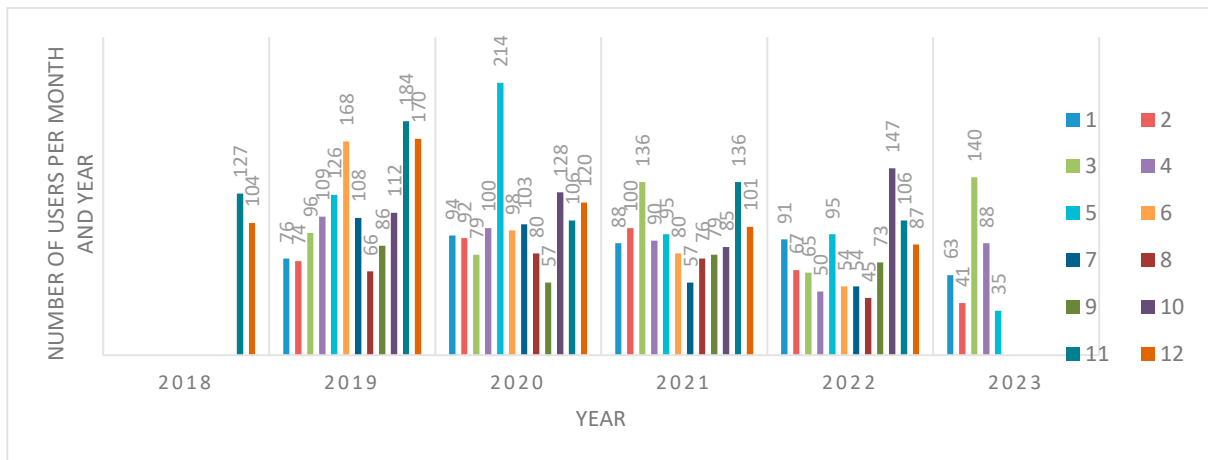


Fig. 8. Total number of users pe month and year

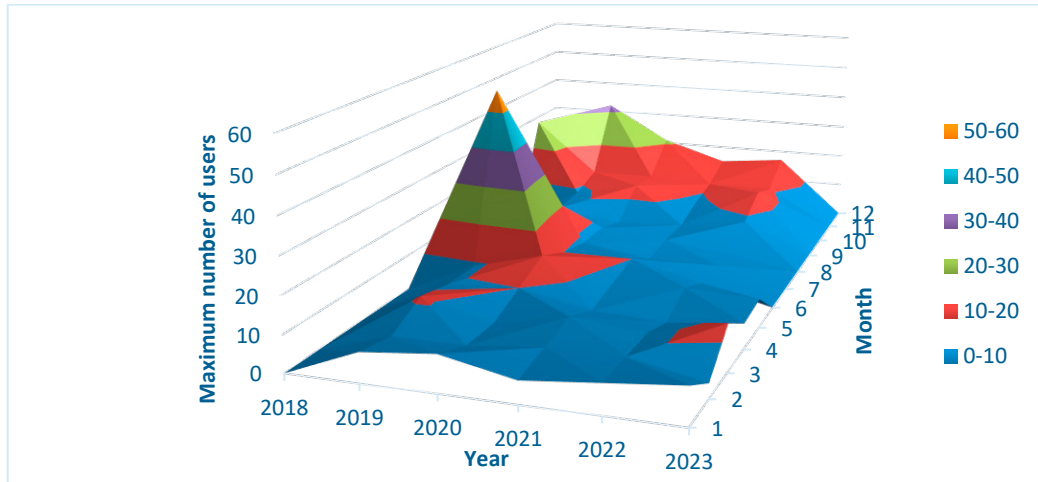


Fig. 9. Maximum number of users per month

Furthermore, from Fig. 9 in which the maximum number of users is displayed, it is obvious that the interest for GLAMs is decreasing. Monthly and yearly distributions of visitors are presented in Fig. 10.

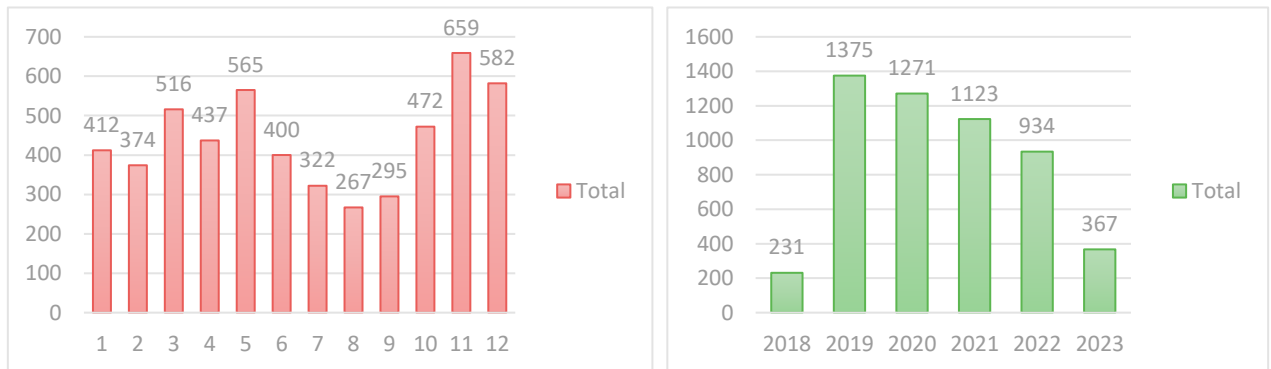


Fig. 10. Monthly and yearly distributions of visitors

4. Conclusions

Assessing visitor behavior in a virtual exhibition is helpful for users to get cultural resources based on their preferences, but it is also helpful for cultural institutions to understand what visitors desire, which collections are among the most attractive, as well as how to encourage visitors to come see the cultural collections in person. In order to pay their expenditures and increase their profits, cultural organizations might use several business methods, such as charging admission fees to (virtual) visitors [7].

Analyzing the evolution of the number of visitors during November 2018 and May 2023, several insights were noticed:

- Spikes appeared on the 1st of December when the Romanians celebrate the national day. Therefore, the content is sensitive to the related events.
- There is a clear seasonal pattern in visiting the GLAMs such as virtual exhibits, users preferring colder months. On summers days, the number of visitors significantly decreases.
- The COVID-19 pandemic led to a smaller number of visitors in the years after lockdowns as they seem less interested in online, probably because in person visits to museums are now possible and they are preferred to online visits.
- The interest from foreign visitors is obvious, therefore, it will be interesting to measure whether an English version of the webpage increases the number of visitors.

In the future it is expected that the evolution from the current *Museum at Home* movement to *Home at The Museum* one [1] accompanied by an ever more increased participation of people in *Digital Culture* via the so called *Global Digital Citizenship* [8].

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