Zenith Outdoor/Indoor Experience

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D2.2 User Requirements

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Abstract	*The present deliverable provides an overview of the user requirements analysis. It outlines the strategic objectives pursued within the respective Work Package 2 "User requirements, pilot testing and result evaluation". The document provides an introduction, the scope of the survey, and the design. It also includes the implementation of the survey, the analysis of the results, and conclusions.* *Moreover, this document reflects the collaborative and interdisciplinary nature of the project, highlighting the contributions of each partner involved. Preliminary results, identified challenges, and next steps are also discussed to provide a comprehensive understanding of the work completed and the direction forward. The deliverable is aligned with the broader goals of the Erasmus+ programme and contributes directly to the promotion of lifelong learning, digital heritage, and innovation in adult education.*

THE CONSORTIUM

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GLOSSARY

GDPR	General Data Protection Regulation
AR	Augmented Reality
CH	Cultural Heritage
POI	Point of interest
UX	User Experience
UI	User Interface

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1. INTRODUCTION

This deliverable constitutes a component of the implementation activities of the ZOE project (Zenith Outdoor/Indoor Experience for Cultural Tours with AR Technology and 3D Platform).

The objective of this deliverable is to present the implementation of the Activity "User Requirements" in the respective Work Package 2. The document delineates the methodology of designing the survey, the execution of the survey, and the analysis of the results. The objective of the survey is to ascertain the user requirements and application use cases for AR in the domain of cultural heritage.

The content herein reflects the collaborative efforts of the project consortium and contributes to the overall goal of promoting accessible, inclusive, and technology-driven lifelong learning experiences. It serves to document the progress made by the consortium partners and to provide a structured account of the methodologies employed, tools developed, and coordination mechanisms applied.

2. SURVEY

2.1 Survey design

The objective of the research was to gather feedback from users, assess their level of engagement and identify areas for improvement in the user experience (UX) of cultural AR applications. The chosen methodology was a survey, conducted using questionnaires. In order to gather more information on this matter, a questionnaire was disseminated among two groups. This term refers to end users and stakeholders who represent organisations, institutions and communities with a vested interest in the project outcomes. Such stakeholders may include, but are not limited to, cultural institutions, tourism agencies and local governments.

The questionnaire comprised a total of **25 questions**, which were divided into seven sections. These sections included data policy acceptance and an explanation regarding augmented reality (AR) technology. The collection of questionnaires was undertaken for the purpose of gathering basic demographic information, with the objective of creating a profile for each respondent. The questionnaire comprised four sections, each pertaining to a specific use case that is to be implemented in the final product.

The objective of this survey was to identify specific requirements and present four distinct, illustrative use cases to the participants, with a view to demonstrating the potential of augmented reality (AR) to enhance the cultural heritage experience. Each use case delineated a discrete scenario, thereby enabling users to conceptualize and appraise the potential of AR. These were crafted to cover various aspects, from on-site education to remote engagement. Examples of such phenomena include:

The specific cases for AR in the ZOE questionnaire were 4 distinct scenarios:

- **Use Case 1: Large landmark**
- **Use Case 2: Small monument on a square**
- **Use Case 3: Infrastructure around a street**
- **Use Case 4: POI (Point of interest) based navigation system**

The first part includes general questions to create a profile of the respondent, including basic demographics, professional status, and participation in cultural heritage-related activities, as well as understanding diverse perspectives on cultural heritage

engagement. It goes beyond basic demographics to capture the perception of their personal and professional involvement with heritage.

In order to evaluate the depth of engagement, it is necessary to collect the professional profiles of participants. The classification of individuals into cohorts (e.g. academic, curatorial, or non-specialist) facilitates a detailed comparison between professional stakeholders and the visiting public.

To ensure all participants, regardless of their prior technical knowledge, understand the core concept of Augmented Reality, a clear and concise definition will be provided early in the section pertaining to AR use cases. This acts as a common reference point, preventing confusion and ensuring meaningful responses. The definition given was based on established literature:

"Augmented Reality (AR) is a technology that overlays digital information (such as 3D models, videos, audio, or text) onto the real-world environment when viewed through a device (like a smartphone, tablet, or smart glasses). Unlike Virtual Reality (VR) which fully immerses you in a digital world, AR enhances your perception of the real world with digital content." (Garzón & Acevedo, 2019).

Section	Question	Type	Scope
General Questions	**Q1** Please select your age group.	Radio	To understand generational preferences and digital literacy levels.
	Q2 What is your gender?	Radio	For broader demographic understanding.
	Q3 My profession or field of study is directly related to cultural heritage. Specify your job title (in case you are a student, please name your course of studies).	YES/NO	Level of engagement
	Q4 Which of the following entities do you work for?	Radio	Working conditions
	Q5 I am part of a local community residing	YES/NO	Deep into their

	near a cultural heritage site.		relationship with cultural heritage.
	Q6 I am visiting [Vienna] | [Thessaloniki] as a tourist / traveler.	YES/NO	distinguishing between professionals and general users (tourists).
	Q7 How often do you use digital tools for cultural heritage?	Single selection	The frequency and nature of their interaction with cultural heritage
	Q8 How often do you visit cultural heritage sites?	Single selection	Frequency of cultural heritage site visits
	Q9 What primary purpose drives you to engage in cultural heritage applications	Radio	Motivation for visiting
	Q10 How frequently do you either visit cultural heritage sites or spend time learning about them?	Radio	Depth of engagement
	Q11 When visiting a cultural heritage site, how do you prefer relevant information to be presented to you?	Ranking	User preference
	Q12 For each of the following statements, please rate which apply to you	5-point selection	Personal ranking
Use case 1	**Q13** What information about this large landmark would you like to reveal?	5-point selection	UX
	Q14 What is the preferred format for presenting this information?	5-point selection	UI/UX
	Q15 Would you like to receive comparative information, e.g. the size of the landmark compared to similar landmarks?	5-point selection	UX
Use	**Q16** What information about the monuments	5-point	UX

case 2	would you like to reveal?	selection	
	Q17 What is the preferred format for presenting this information?	5-point selection	UI/UX
	Q18 When should information be presented?	Single selection	UI/UX
	Q19 Would you like to receive comparative information, e.g. the material of the monument compared to similar monuments?	5-point selection	UX
Use case 3	**Q20** What information about the urban infrastructure would you like to reveal?	5-point selection	UX
	Q21 What is the preferred format for presenting this information?	5-point selection	UI/UX
	Q22 Would you like to receive comparative information, e.g., the war damage of the environment compared to the rest of the city or other cities?	5-point selection	UX
Use case 4	**Q23** How would you prefer to plan a route reflecting your personal interests?	Ranking	UI/UX
	Q24 How would you prefer to access the routes	5-point selection	UI/UX

2.2 Survey implementation

The survey was implemented through **LimeSurvey** which is provided by AUTH's and TUW's Information Technology Center. The questionnaire was released after receiving ethical approval on the content, which is described in the respective task and deliverable.

The survey was run from August 2025 to October 2025, separately. The data was collected in the repositories of the two universities. Following the collection of the relevant data, the analysis was implemented by AUTH.

2.3 Survey results

The following section presents the findings from the user requirements survey, which served to align the application's technical development with actual visitor needs. These results offer critical insights into preferred delivery methods and content priorities, establishing a functional baseline for the application's features and interface design.

The analysis is being presented with a figure and the following paragrafp which describes the basic points.

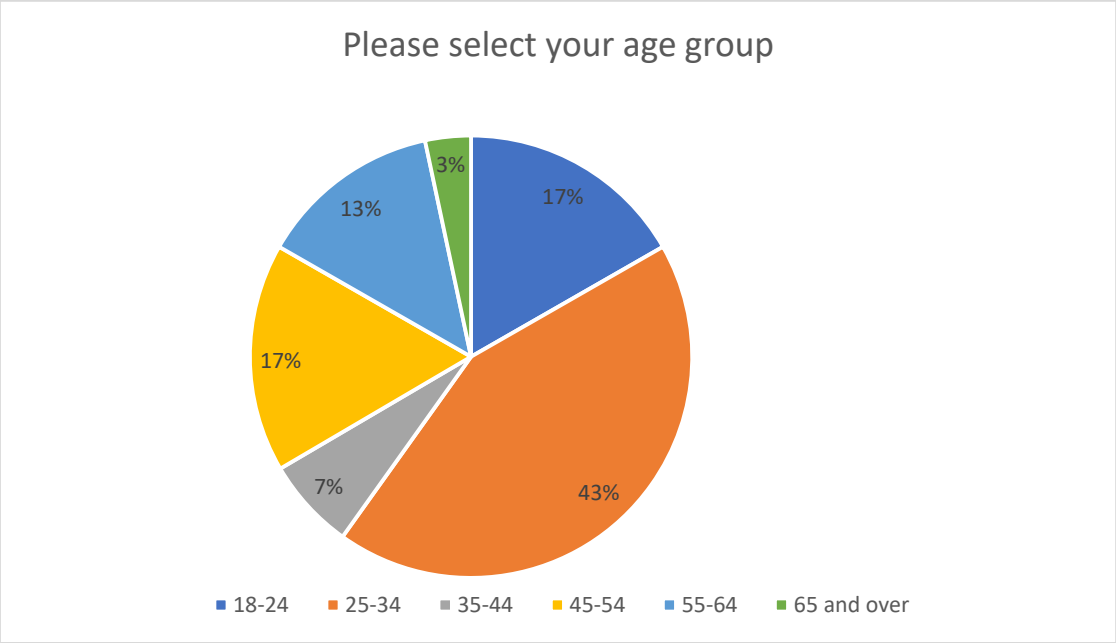

Figure 1. Survey response: Age group

All age groups are well represented. The 25-34 age group is the clear majority, accounting for nearly half of the responses at 43%. The two youngest groups (18-24 and 25-34) collectively make up 60% of the surveyed audience. The 45-54 age group is the third largest at 17%, indicating strong participation from middle-aged adults as well. The 35-44 and 65 and over groups have the lowest representation at 7% and 3%, respectively.

Figure 2. Survey response: Gender

There are equally female and male respondents which will not affect any bias error.

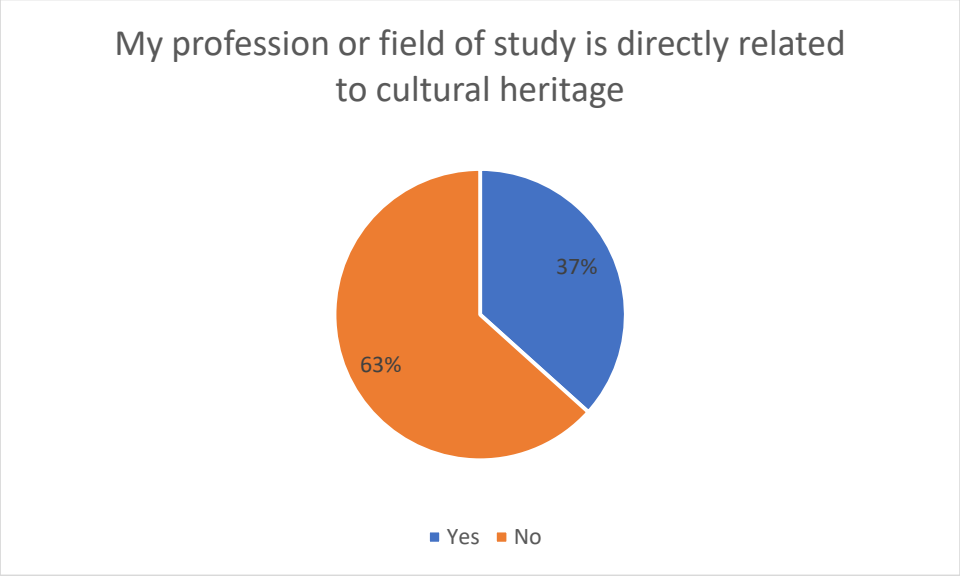

Figure 3. Survey response: Profession/studies

The data clearly indicates that the majority of respondents are not directly involved in the cultural heritage studies field professionally or academically. This reinforces the necessity for the application to provide information that is accessible, easy to understand, and well-explained rather than content that assumes specialist knowledge.

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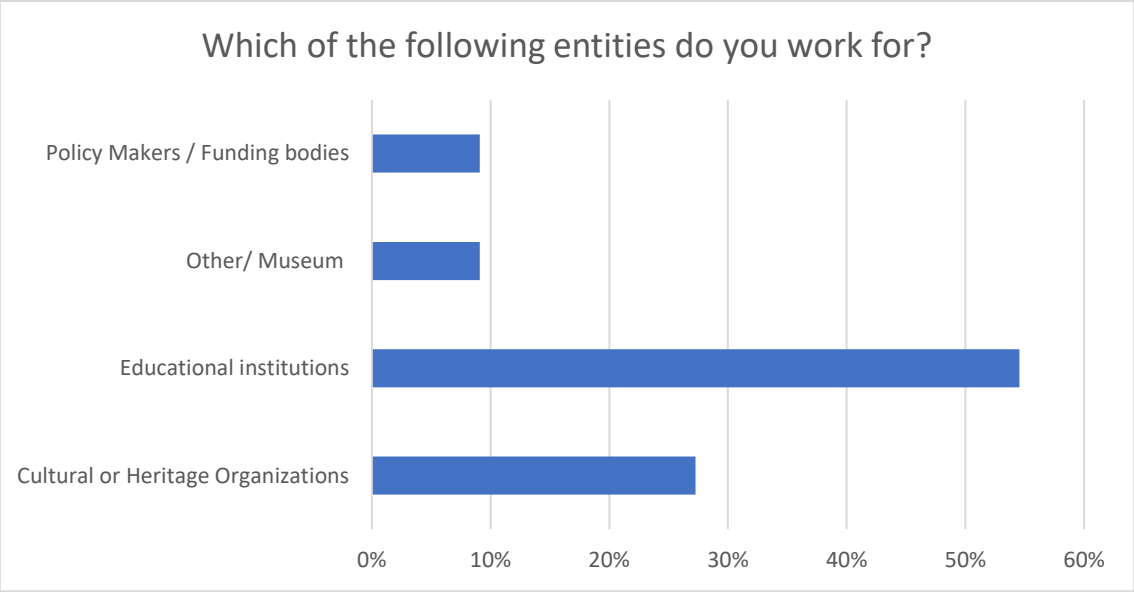

Figure 4 Survey response: Working position

If the response was in the affirmative, the supplementary question pertained to their position. The majority of these are from educational institutions. The significant presence of representatives from educational institutions further corroborates the earlier finding that educational motivation is the primary catalyst for engagement with cultural heritage applications (43%).

The application should be designed with two key audiences in mind: the general public, who will be the primary beneficiaries, and educators and researchers (the 55% majority of the professional group). To satisfy the needs of the latter, the application should ideally offer features that support structured learning, research, and high-quality historical data.

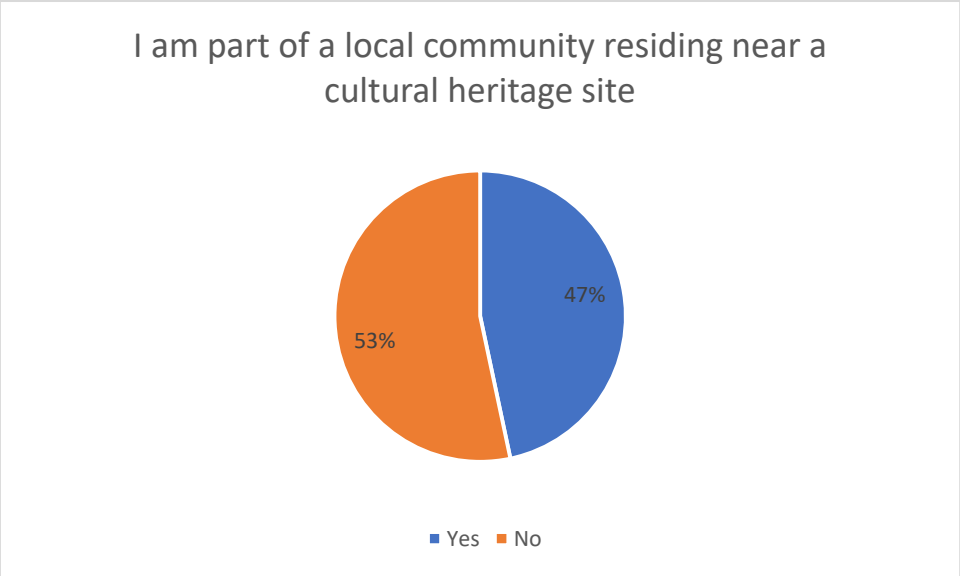

Figure 5. Survey response: Participation in CH community

The data indicates that a slightly larger portion of the respondents (53%) who are engaged in local community near a cultural heritage site compared to those who don't (47%).

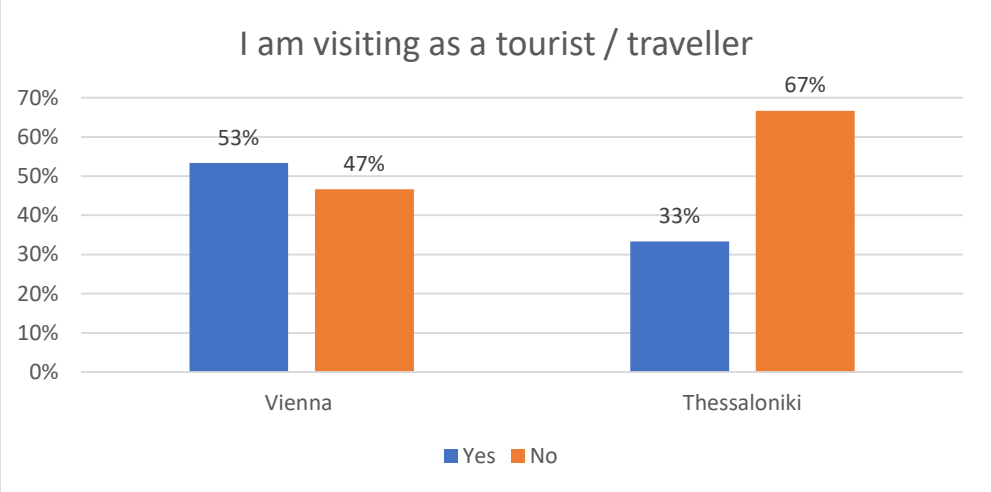

Figure 6. Survey response: Tourist/traveller

The results presented in this question are divided into two main categories according to the city in which the questionnaire was implemented.

In the Vienna sample, the audience is almost evenly split but slightly favors tourists/travellers over residents or long-term visitors. In the Thessaloniki sample, the majority of respondents (two-thirds) are not visiting as tourists/travellers. This

suggests the audience surveyed in Thessaloniki primarily consists of local residents or people on non-tourism-related visits (e.g., business, academic).

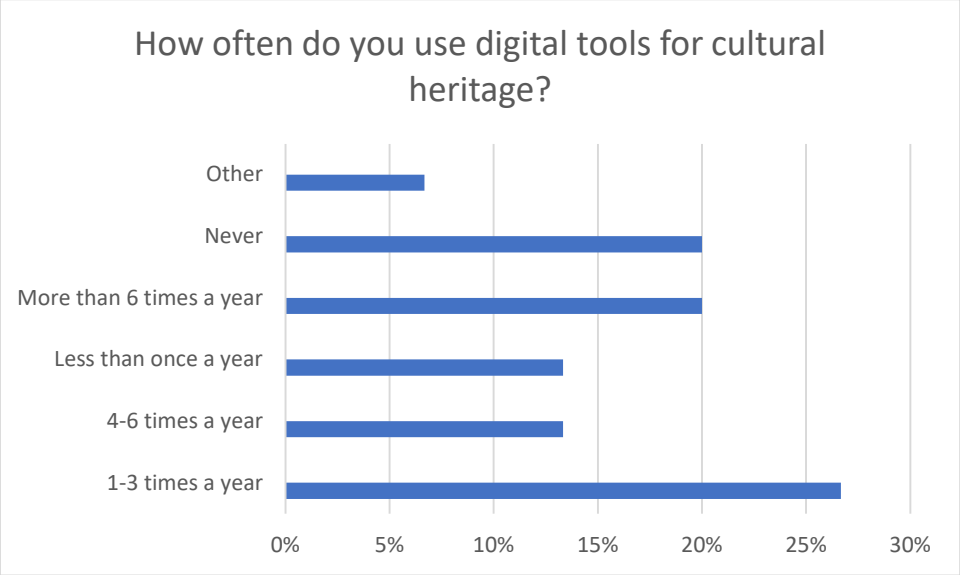

Figure 7. Survey response: Frequency of using digital tools for CH

The distribution of usage frequency is quite varied, indicating a significant split between occasional users and highly frequent users. The high percentage of people who use digital tools 1-3 times a year (27%) suggests that usage often coincides with the occasional physical trip to a heritage site. The fact that a combined 40% use digital tools either "Never" or "Less than once a year" highlights a clear opportunity to convert these less frequent or non-users by creating an application that strongly aligns with their known preferences (e.g., highly visual, easy-to-use audio content driven by educational purpose).

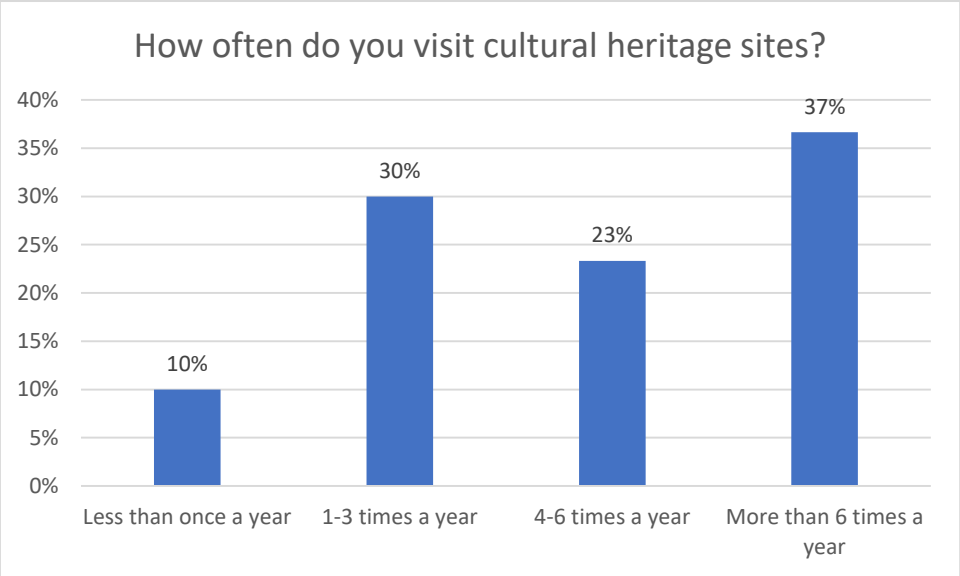

Figure 8. Survey response: Frequency of visiting cultural heritage sites

The combined percentage of those who visit 4 or more times a year is substantial: 37% (More than 6 times) + 23% (4-6 times), is approximately 60%. This high frequency of physical visits suggests that the target audience for this application is an active user group that regularly seeks out cultural experiences. The application is likely targeting people who are already physically present at or near these sites, reinforcing the need for highly desired formats like audio and visualizations for on-site use (as noted in a previous chart).

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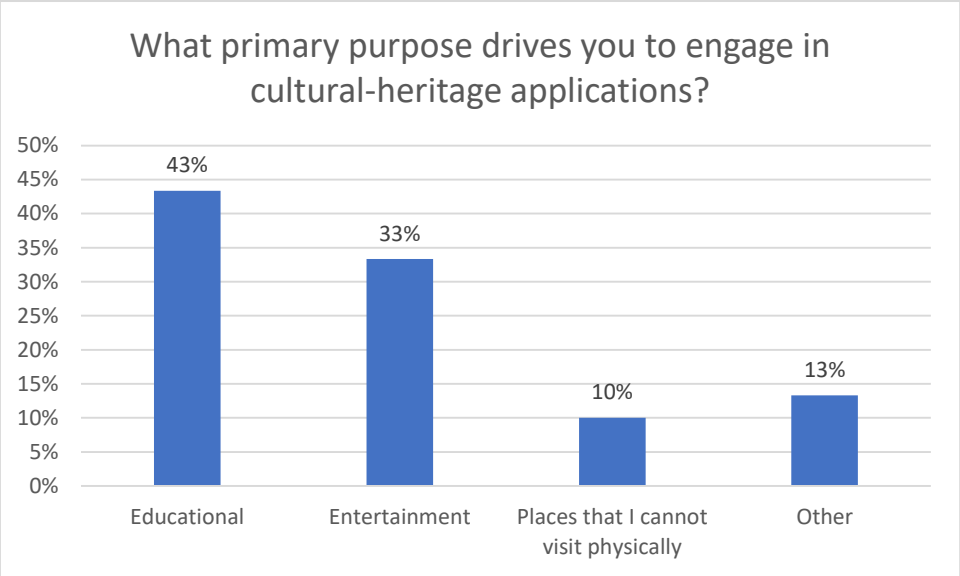

Figure 9. Survey response: Purpose of engaging

The data clearly indicates that learning and education are the main factors driving users to cultural-heritage applications, followed by entertainment. The two dominant purposes: Educational (43%) and Entertainment (33%), combine to make up 76% of the primary drivers. A successful cultural-heritage application should therefore prioritize a strategy that blends robust, accurate educational content with engaging and entertaining presentation methods to meet the needs of the vast majority of its users.

Other: daily, on professional purpose and personal interest, interest, Work, As part of local authorities for the implementation of events

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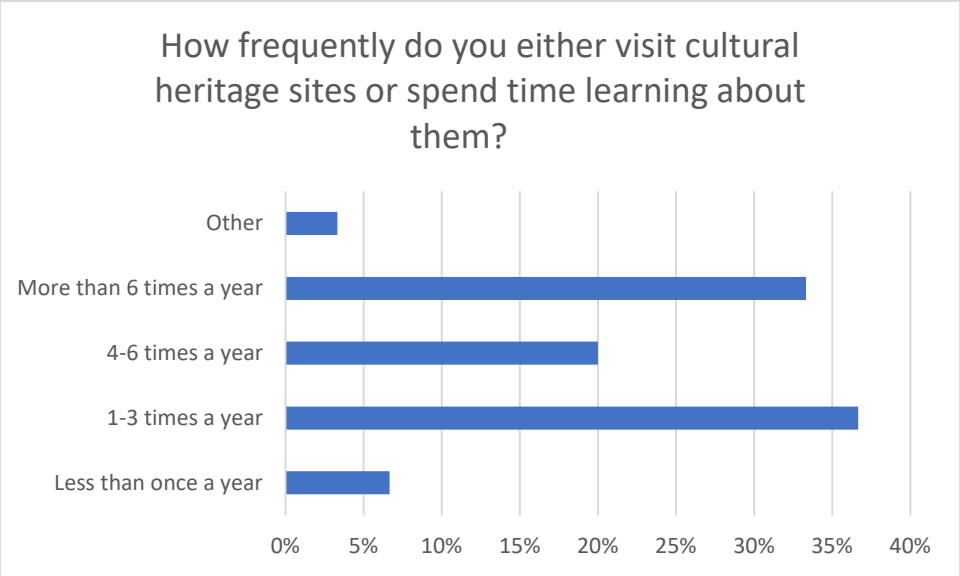

Figure 10. Survey response: Frequency of visiting or learning about CH

Based on the chart, the survey results indicate a high level of engagement with cultural heritage among the respondents. The data confirms that the surveyed population is, on the whole, a highly active and interested audience in cultural heritage, with 90% engaging 1 or more times a year and the most common frequency is 1-3 times a year, accounting for approximately 37% of respondents. The responses which are given in "other": include daily frequency on professional purpose.

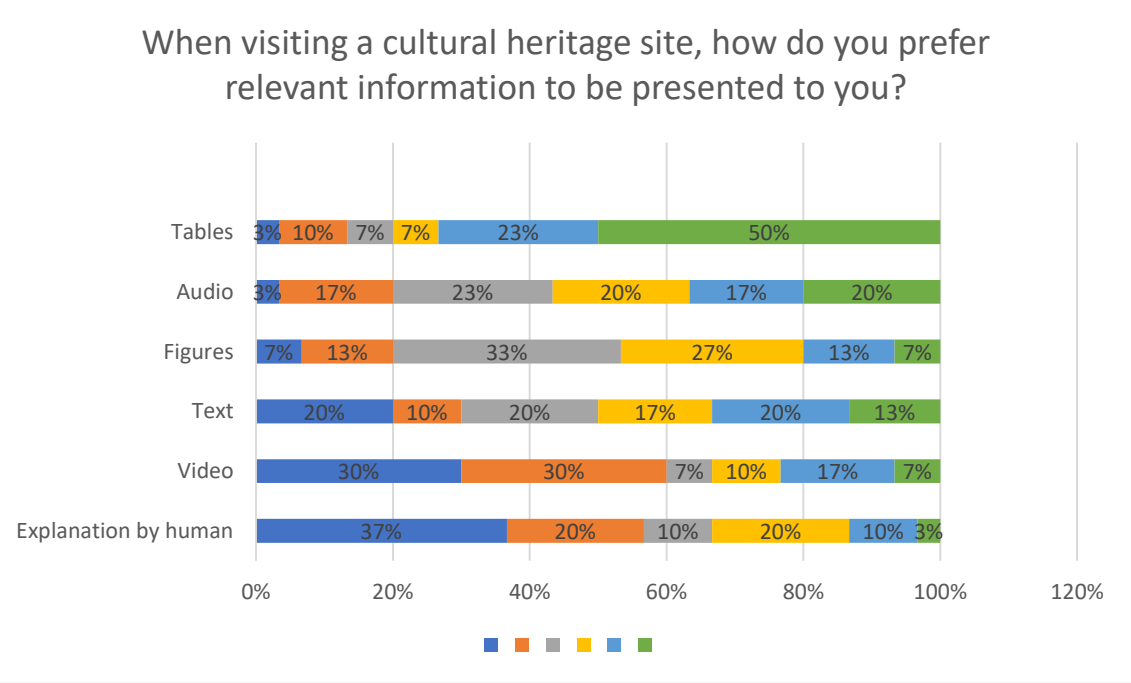

Figure 11. Survey response: Ranking preferable way

The survey results clearly indicate a distinct hierarchy of visitor preferences, with human-centred storytelling and dynamic visual media significantly surpassing conventional data presentation methods. "Explanation by a human" emerged as the gold-standard delivery method, securing the top rank for 37% of respondents. This underscores a deep-seated desire for personal interaction and the flexibility of immediate Q&A. In instances where human guides are not available, users strongly favour "Video" as their primary alternative, with a 60% combined preference in the top two ranks. This underscores the importance of media-rich, engaging content in comparison to static displays.

Conversely, there is a distinct aversion to "dry" information formats. "Tables" were overwhelmingly rejected, appearing at the bottom of the rankings for 73% of participants. Although "Text" performed marginally better, it remains a secondary preference, with 33% of users ranking it poorly compared to only 30% who favoured it. Collectively, these findings suggest a "show, don't just tell" mandate for application development: while visitors still value historical facts, they expect that data to be translated into immersive visuals and narratives rather than being presented in raw, tabular, or text-heavy formats.

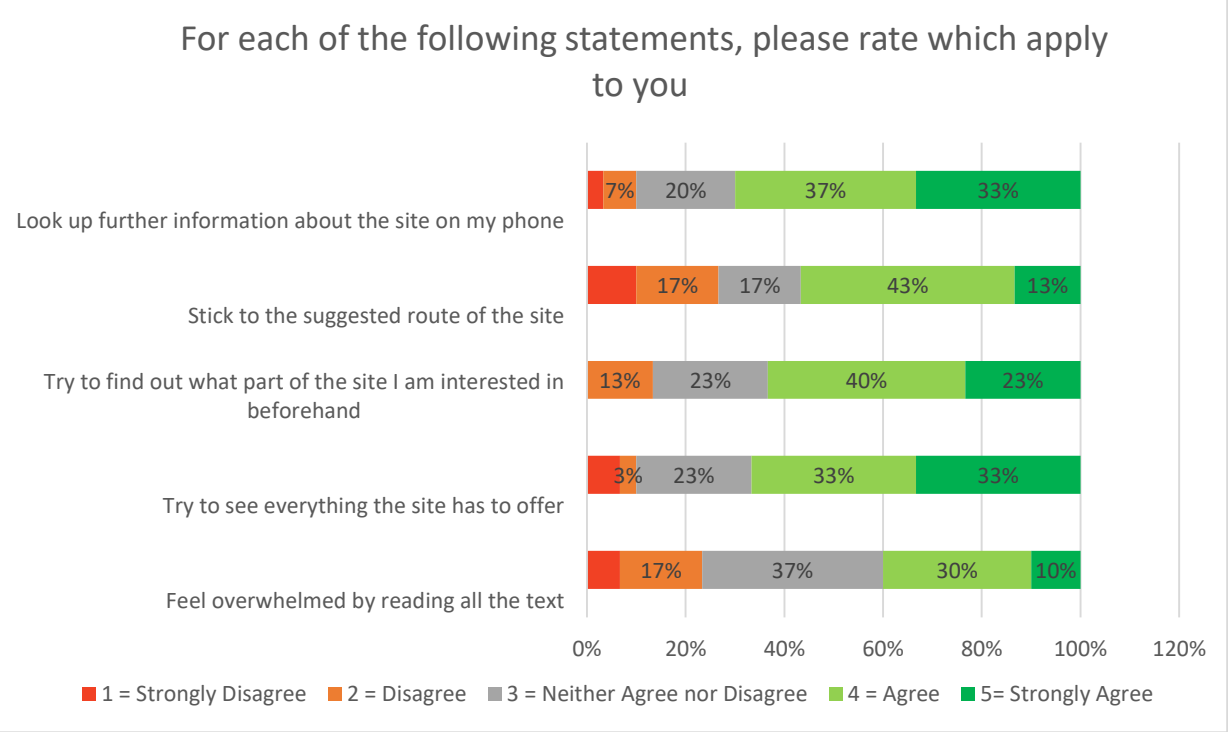

Figure 12. Survey response: Ranking behavior in cultural heritage sites

The results reveal a visitor profile that is digitally proactive and eager for comprehensive exploration, yet susceptible to information fatigue. A significant majority of respondents (70%) agree or strongly agree that they look up further information about the site on their phones, indicating that mobile devices are already a primary tool for real-time engagement. This proactive behavior is mirrored in their planning, as 63% of participants try to identify their specific interests beforehand, and 66% strive to see everything the site has to offer. While most visitors (56%) are willing to follow a suggested route, the data suggests a narrow margin for error in content delivery: 40% of respondents admit to feeling overwhelmed by reading all the text provided at a site. This underscores a critical need for your application to provide structured, manageable "bites" of information that support thorough exploration without contributing to the cognitive overload that nearly half of the audience experiences.

From Figure 13 to Figure 15 the analysis refers to the Large Landmark.

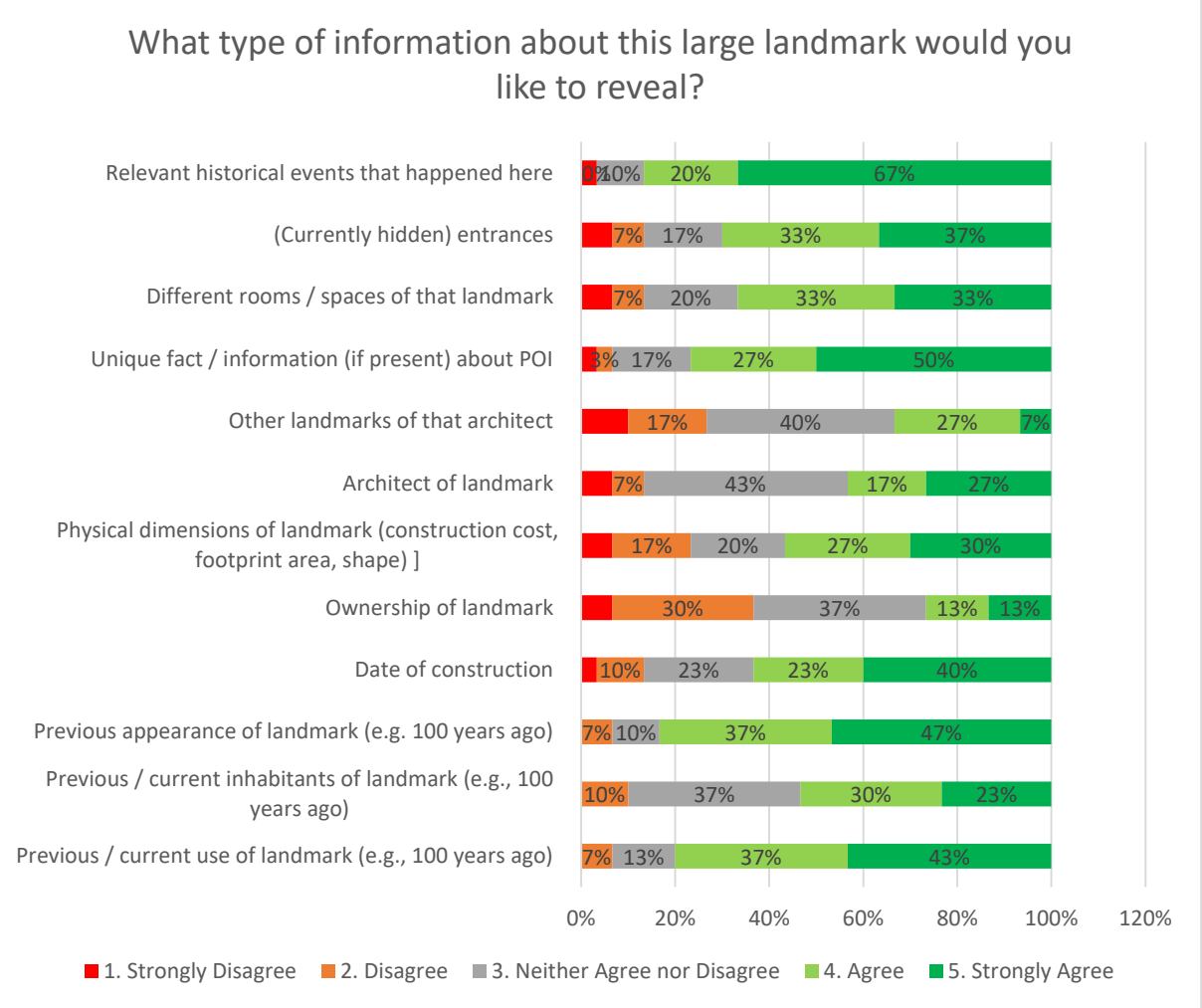

Figure 13. Survey response (Use Case 1): Type of information for large landmark

The data strongly suggests that the application content should prioritize stories, history, and physical context (appearance, use, spaces, facts) that bring the landmark to life. Details less relevant to the direct on-site experience, such as administrative or extended architectural background, should be deprioritized.

When it comes to the specific "layers" of information visitors wish to reveal, there is an overwhelming preference for storytelling and visual transformation over raw data. The strongest interests lie in "Relevant historical events" (87% agreement) and the "Previous appearance of the landmark" (84% agreement), highlighting a desire for narrative context and visual "time-travel" experiences. Visitors are also keenly interested in the "unseen," with 70% wanting to reveal currently hidden entrances. In contrast, "ownership of the landmark" and the "architect's other works" received the least interest, suggesting that visitors value the immediate, physical experience and

historical drama of the site far more than its administrative or external biographical details. This data provides a clear roadmap for the application: prioritize immersive "then-and-now" visuals and historical anecdotes while keeping technical data like dimensions and ownership as optional, secondary layers.

High Priority: Users overwhelmingly want historical context, unique facts, and information on the past appearance/use of the landmark. These categories should be prioritized for content development.

Moderate Priority: Information on hidden entrances, internal spaces, and construction dates/dimensions is also desired by a strong majority.

Low Priority: Content focused on the ownership or architect's other works receives the lowest agreement and highest disagreement/neutral response, suggesting these details are less critical to the average user.

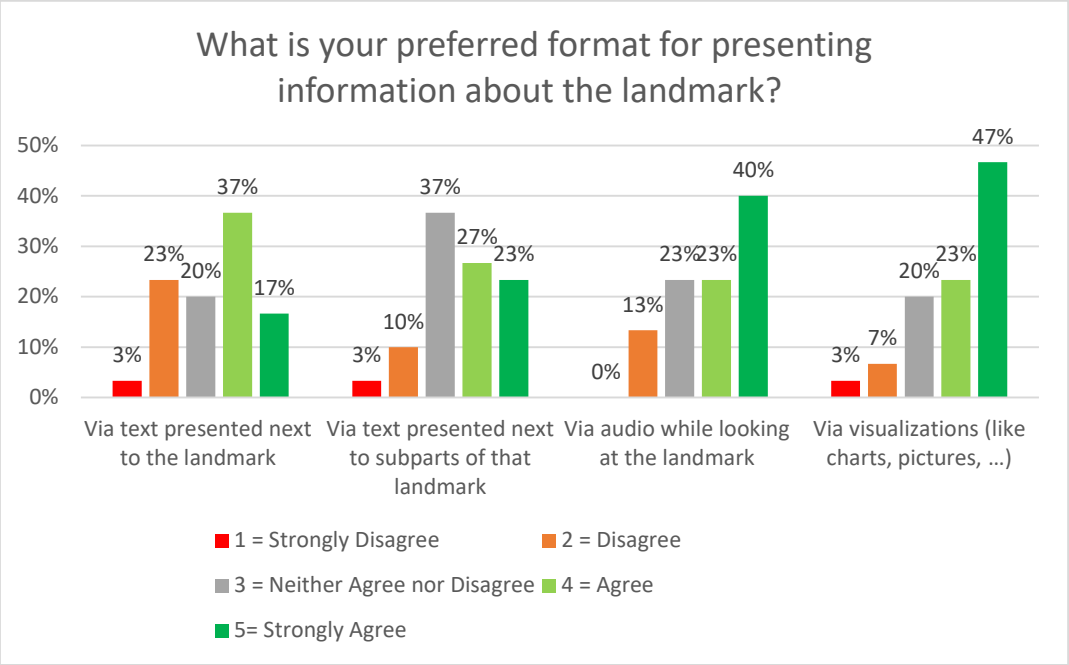

Figure 14. Survey response (Use Case 1): Preferred format for large landmark

The data reveals that visualizations and audio are the most strongly preferred formats with the highest overall agreement (sum of 'Agree' and 'Strongly Agree'), while text-based formats have higher levels of disagreement or neutrality.

The two formats are:

Via visualizations (like charts, pictures, ...): This is the most preferred format, with a total agreement of 70% (23% Agree + 47% Strongly Agree). It also has the lowest total disagreement (3% Strongly Disagree + 7% Disagree = 10%). This suggests a strong user preference for visual and easy-to-digest content.

Via audio while looking at the landmark: This is the second most preferred, with a total agreement of 63% (23% Agree + 40% Strongly Agree). It has the lowest disagreement rate of all options (0% Strongly Disagree + 13% Disagree = 13%). This indicates a desire for non-intrusive, immersive information while physically viewing the landmark.

Users show a clear preference for modern, engaging formats that either simplify data (Visualizations) or allow for hands-free consumption while viewing (Audio). While text is still acceptable to many, it's not the format of choice, especially when presented next to the main landmark. Future content design should prioritize visual and audio presentation methods.

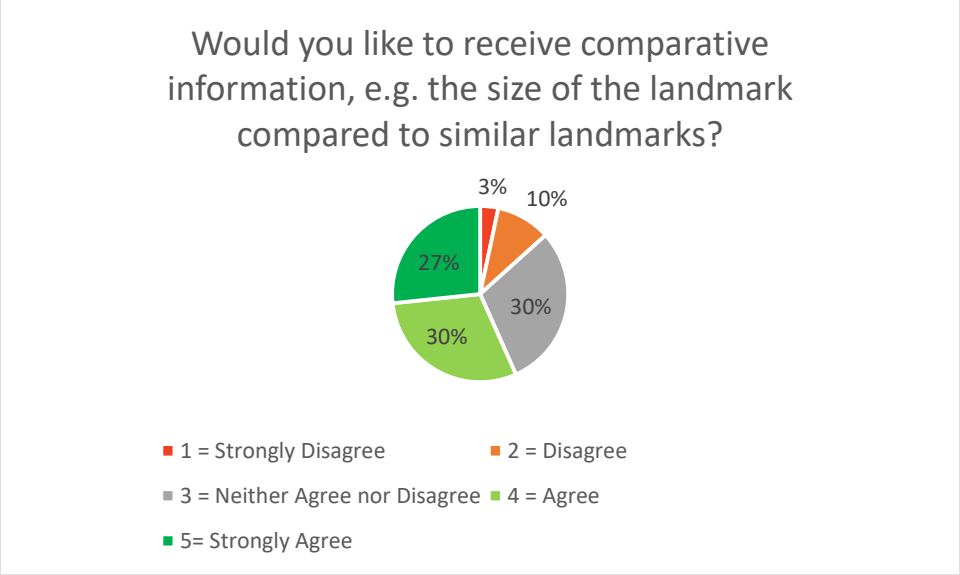

Figure 15. Survey response (Use Case 1): Comparative information for large landmark

A majority of respondents either Agree or Strongly Agree that they would like to receive comparative information. A significant portion of respondents took a neutral position. The data suggests a clear preference (57%) among users for receiving comparative information about landmarks. While the neutral group is also large (30%),

the very low rate of disagreement (13%) indicates that including this type of comparative data would likely be a valuable feature and satisfy the majority of the user base.

From Figure 16 to Figure 19 the analysis refers to the Large Landmark.

Use Case 2 Small monuments on a square

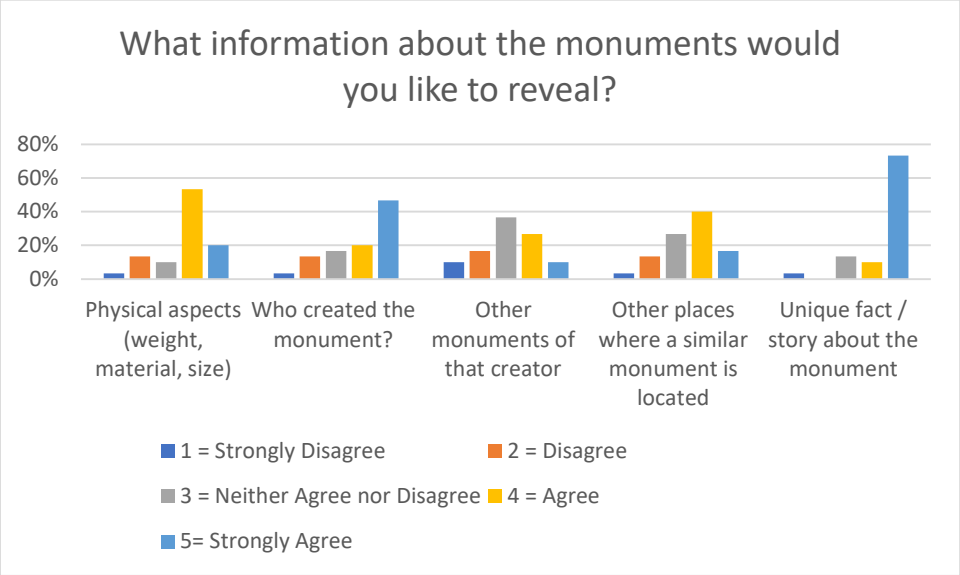

Figure 16. Survey response (Use Case 2): Type of information

The application's content strategy should be driven by unique facts and stories about the specific monument. While details about the creator and physical dimensions are also desired by a large portion of users, the application should not primarily focus on the creator's other works.

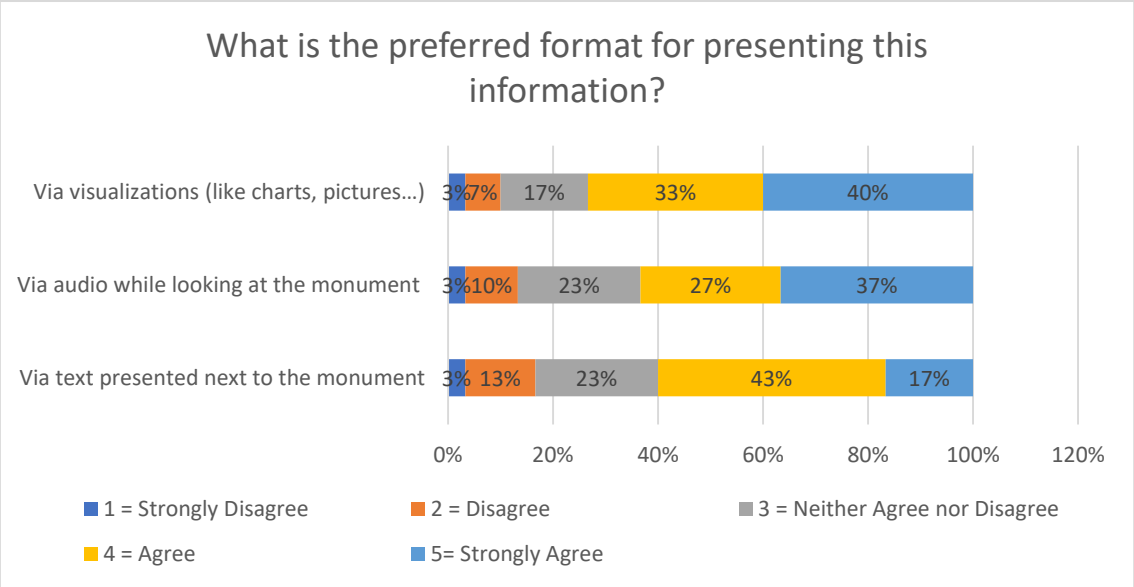

Figure 17. Survey response (Use Case 2): Prefer format small monument

Since a majority desires it and very few disagree, including comparative information is a highly recommended feature. This is best delivered through visualizations (e.g., charts or side-by-side images). Based on these findings, the application's content strategy should focus on rich historical narratives and unique facts, delivered primarily through visuals and audio that are designed to be easily consumed on-site. While accepted, text-based methods have lower "Strongly Agree" rates and higher disagreement.

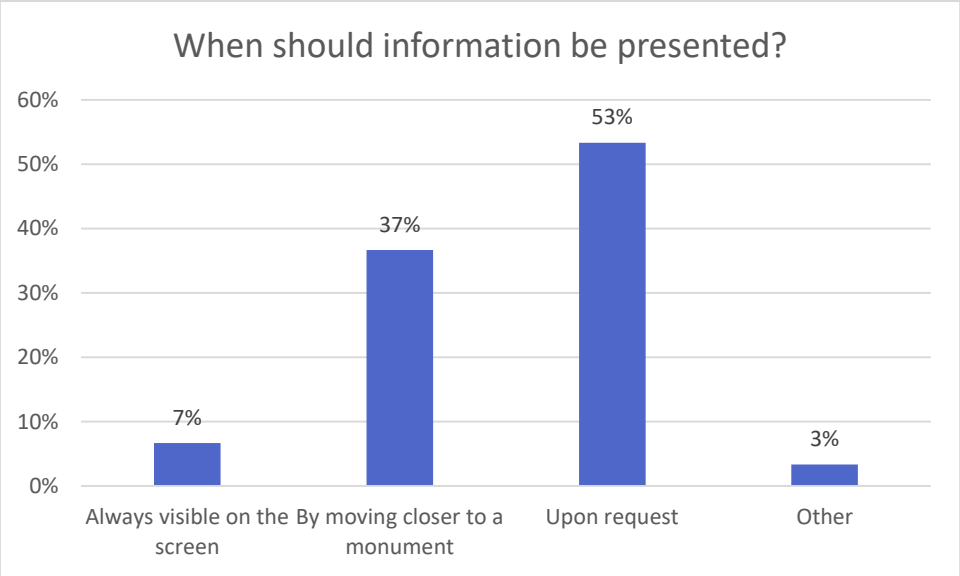

Figure 18. Survey response (Use Case 2): Appearance of information

The analysis reveals a significant user preference for on-demand (53%) and contextual (37%) information delivery. Any system designed to present information to users (especially in cultural or tourist contexts) should prioritize the "Upon request" model, followed by the "By moving closer" trigger. A system where information is "Always visible" would likely fail to meet the needs of the vast majority of potential users.

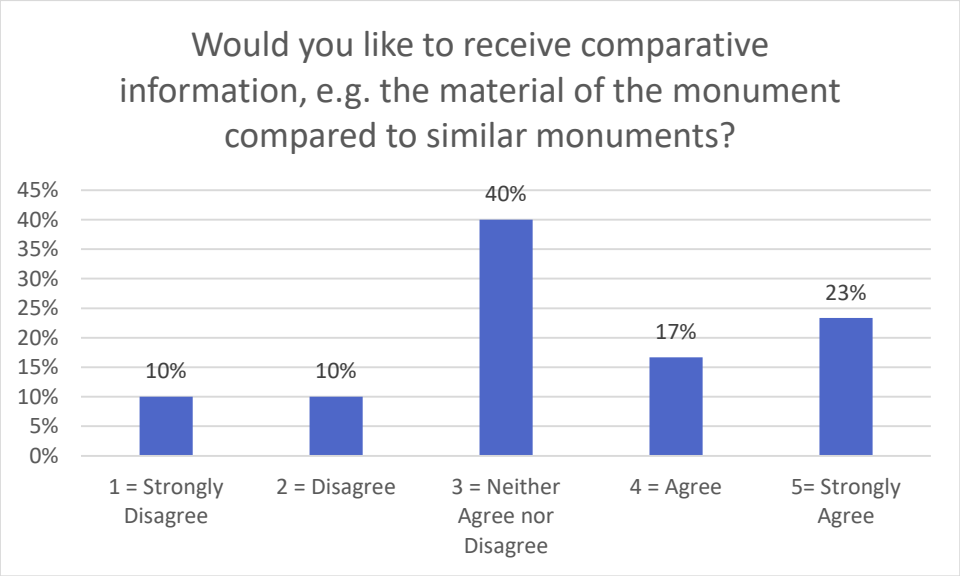

Figure 19. Survey response (Use Case 2): Comparative information

The results are highly split, dominated by neutrality (40%) and agreement (40%).

Significant Demand: Since 40% of users are open to receiving comparative information (Agree or Strongly Agree), there is a clear segment of the user base that values this type of data. For this group, providing comparisons (e.g., material, age, style) would enhance the experience. Crucially, the aversion to this information is relatively low (20% Disagree/Strongly Disagree). Given the high neutrality, a system should likely offer comparative information as an optional, non-intrusive feature. This approach caters to the 40% who want it, while not burdening the 40% who are indifferent or the 20% who actively dislike it, aligning with the "Upon request" preference found in the previous analysis

From Figure 20 to Figure 22 the analysis refers to Use Case 3

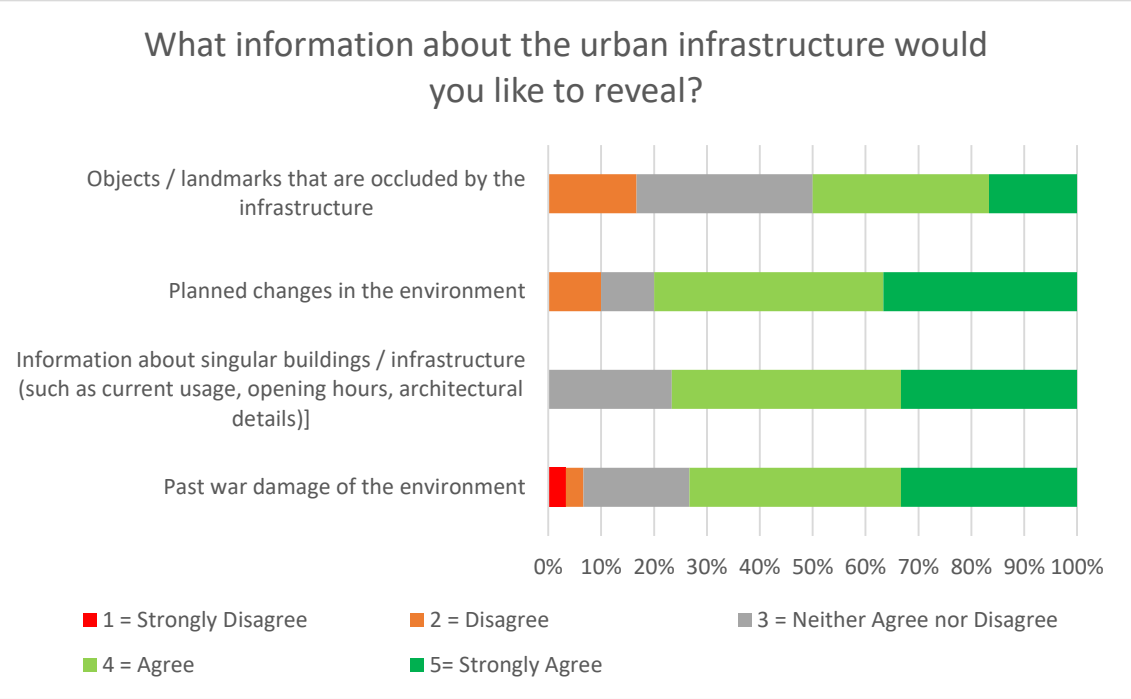

Figure 20. Survey response (Use Case 3): Type of information

There is a clear and strong overall preference for revealing all four types of urban infrastructure information, as the combined percentage for "Agree" (4) and "Strongly Agree" (5) outweighs the negative and neutral responses for every category.

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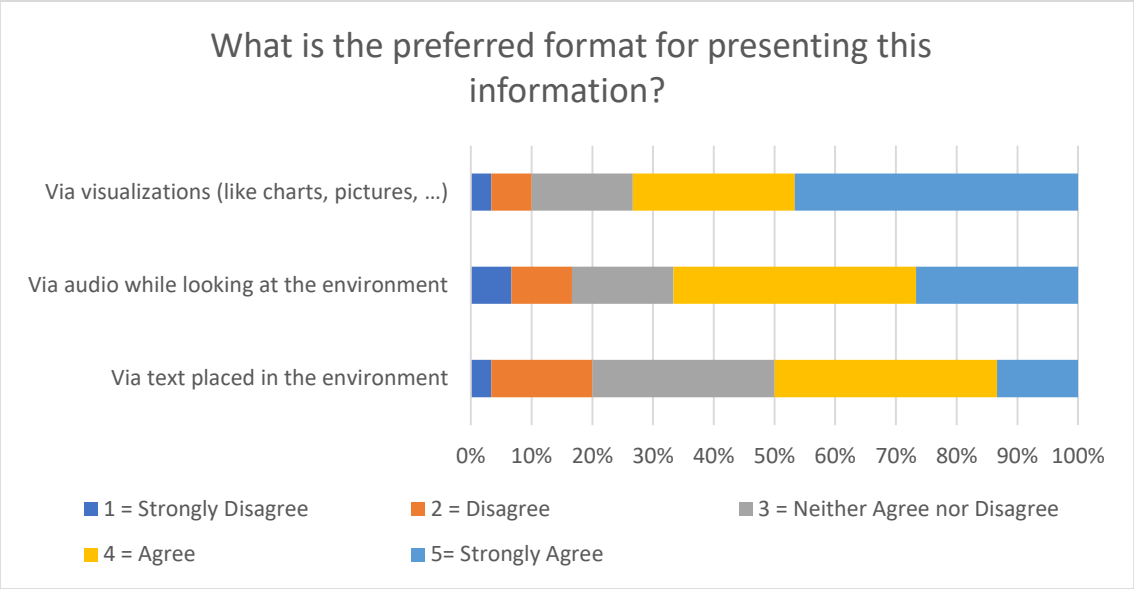

Figure 21. Survey response (Use Case 3): Preferred way for presenting information

Regarding the presentation of this content, the data establishes a clear preference for sensory-rich formats over traditional reading non-text-heavy formats that either provide rich visual detail or allow for hands-free consumption while viewing the environment.

Presentation "via visualizations" is the most favoured format, with nearly 75% of respondents agreeing or strongly agreeing with its use. Audio-based information also received strong support, with 67% preferring to listen while looking at the environment. While "text placed in the environment" remains a viable option, it garnered the highest neutral and negative feedback (50%) among the three formats. Collectively, these findings provide a clear mandate for the application: prioritize immersive "then-and-now" visuals and audio narratives while keeping textual data as a concise, secondary layer to avoid overwhelming the user. The design of an information system should prioritize Visualizations (e.g., images, AR overlays, charts) and Audio narration. These methods are seen as the most engaging and least disruptive. Information delivery via static text placed in the environment is the least preferred format and should be minimized or used only as a supplementary option.

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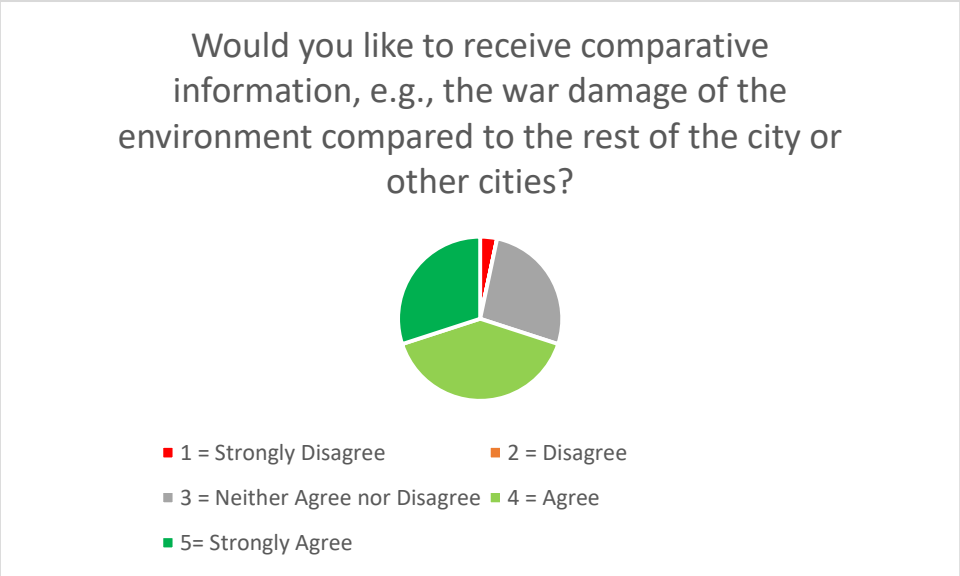

Figure 22. Survey response (Use Case 3): Comparative information

The results reveal a significant interest in contextualizing historical narratives through the lens of conflict, with a clear majority of respondents expressing a positive preference for comparative information regarding war damage. This high demand confirms that users find the relationship between site-specific damage and the broader city—or even other urban centers—to be a valuable and engaging layer of information. Because collective agreement is the dominant response, it is evident that providing this comparative context enhances the perceived depth and relevance of the landmark.

Consequently, the recommendation is to integrate comparative war damage data as a core feature of the application. To balance this high demand with the significant neutral segment of the audience, the information should be offered as an "on-demand" feature. This approach caters directly to users with a strong interest in the subject while ensuring the user interface remains streamlined and does not burden those seeking a more general experience.

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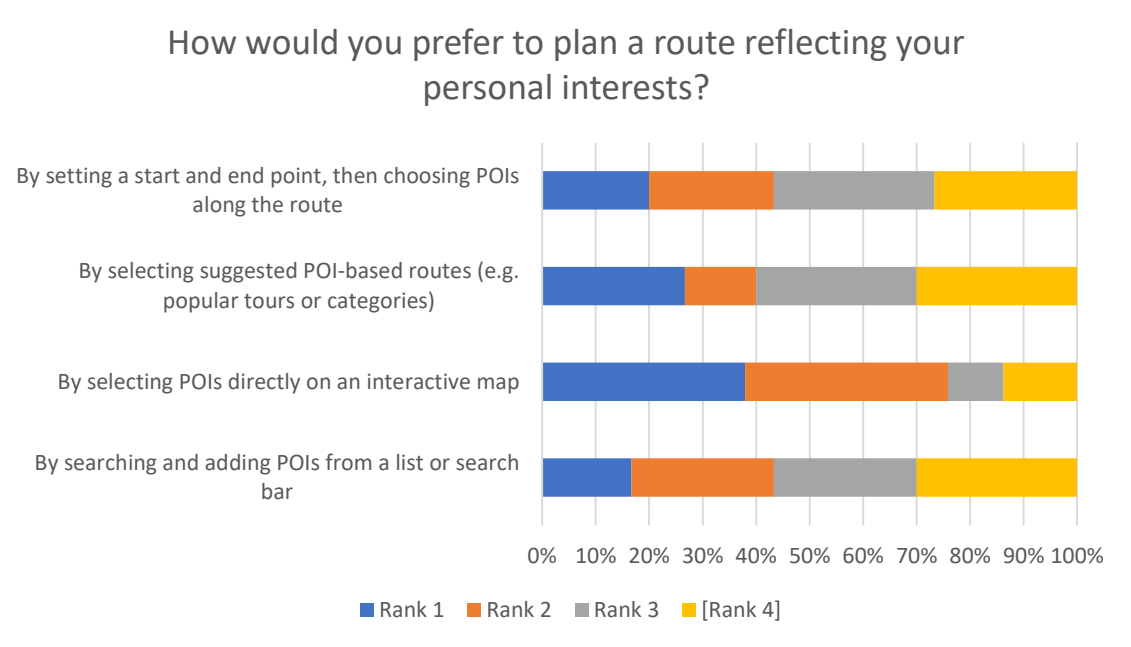

Figure 23. Survey response (Use Case 4): Ranking route with POIs

The stacked bar chart displays how users would prefer to plan a route reflecting their personal interests, by ranking four different methods from Rank 1 (Most Preferred) to Rank 4 (Least Preferred). The goal of route planning is to connect Points of Interest (POIs). The analysis shows that users slightly prefer direct interaction with a map or pre-defined routes over methods that involve extensive text-based setup (like searching/listing or setting specific start/end points).

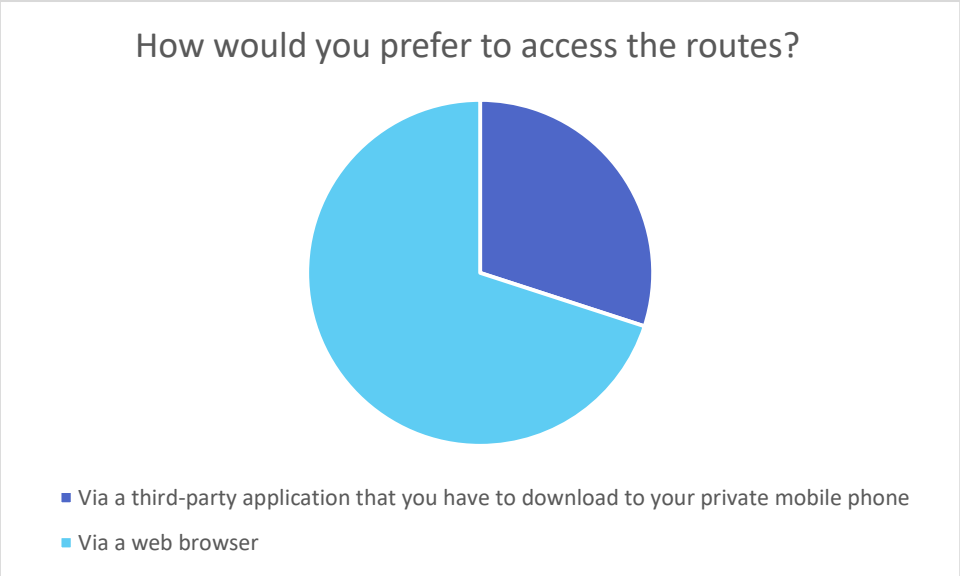

Figure 24. Survey response: Preferred access

The pie chart illustrates the preferred method for users to access routes, offering a choice between a downloadable third-party application and a web browser. Dominant Preference (Web Browser): The clear majority of respondents prefer to access the routes Via a web browser. This suggests users prioritize convenience, avoiding the need to download, install, and manage another dedicated application on their mobile device. The data shows an overwhelming preference for accessing routes via a web browser.

3. SUMMARY AND CONCLUSIONS

The survey findings provide a definitive roadmap for the development of the application, emphasizing a shift from static, text-heavy interpretation to dynamic, on-demand engagement. In order to optimize user satisfaction, the application must prioritize visualizations and audio narratives, as these are the preferred formats for consuming site-specific history. Visitors are particularly interested in comparative information that reveals the landmark's previous appearance and significant historical events, while showing a marked lack of interest in administrative details like ownership or the architect's broader portfolio.

The data indicates that users are "proactive yet overwhelmed", using their phones to look up information on-site but struggling with the cognitive load of reading extensive

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physical signage. Consequently, the application should offer information on demand, allowing users to "reveal" layers of history at their own pace. By providing access through a browser, the tool can leverage the existing habit of mobile search behavior without the friction of a dedicated download. By replacing raw data and tables with immersive visual storytelling, the application has the potential to transform the landmark from a static monument into a living, accessible narrative.

This structured approach ensures that the collected user requirements are comprehensive, well-contextualized, and directly applicable to the design and development of effective AR cultural heritage applications.

REFERENCES

Garzón J., Acevedo J., "Meta-analysis of the impact of Augmented Reality on students' learning gains", Educational Research Review, Volume 27, 2019, Pages 244-260, ISSN 1747-938X,https://doi.org/10.1016/j.edurev.2019.04.001.

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ANNEX 1: QUESTIONNAIRE

User requirment analysis -ZOE Project

As part of the ZOE Project, we need to gain a better understanding of user requirements and preferences regarding cultural heritage applications and platforms. To this end, we are conducting a survey of end users (tourists, cultural enthusiasts and educators from a variety of backgrounds) and stakeholders (e.g. cultural institutions, tourism agencies and local governments) to collect their insights.

The project "ZOE-Zenith Outdoor/Indoor Experience for Cultural Tours with AR technology and 3D platform" which is funded by the Erasmus+ programme (KA220-ADU - Cooperation partnerships in adult education) aims to enhance cultural learning through outdoor AR tours, indoor 3D experiences and a customised navigator that leads the user through sites of interest, all in a gamified environment that keeps the users motivated and eager to engage. The main goal is to achieve high quality, flexible, lifelong and innovative adult education learning for diverse audience, cultural appreciation through enriched experiences, and digital heritage preservation in an appealing interactive environment.

Responsible for conducting this study is the Aristotle University of Thessaloniki (AUTH).

There are 27 questions in this survey.

To continue please agree with the privacy policy. *

Please choose **only one** of the following:

- ◯ Yes
- ◯ No

Please select your age group.

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Choose one of the following answers
Please choose **only one** of the following:

- ◯ 18-24
- ◯ 24-34
- ◯ 35-44
- ◯ 45-54
- ◯ 55-64
- ◯ 65 and over

What is your gender?

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Choose one of the following answers
Please choose **only one** of the following:

- ◯ Female
- ◯ Male
- ◯ Non binary
- ◯ Prefer not to say
- ◯ Other

My profession or field of study is directly related to cultural heritage. Specify your job title (in case you are a student, please name your course of studies).

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Please choose **only one** of the following:

◯ Yes
◯ No

Which of the following entities do you work for? *

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '4 [q3]' (My profession or field of study is directly related to cultural heritage. Specify your job title (in case you are a student, please name your course of studies).) *and* Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

❗ Choose one of the following answers
Please choose **only one** of the following:

◯ Educational institutions
◯ Cultural or Heritage Organizations
◯ Start-ups, tech companies, or research institutions
◯ Policy Makers / Funding bodies
◯ Other

I am part of a local community residing near a cultural heritage site. *

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Please choose **only one** of the following:

◯ Yes
◯ No

I am visiting Thessaloniki as a tourist / traveler *

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Please choose **only one** of the following:

- ◯ Yes
- ◯ No

How often do you use digital tools for cultural heritage?

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

❗ Choose one of the following answers
Please choose **only one** of the following:

- ◯ Never
- ◯ Less than once a year
- ◯ 1-3 times a year
- ◯ 4-6 times a year
- ◯ More than 6 times a year
- ◯ Other

Please describe the digital tool(s) and the purpose you are using it/them for.

Only answer this question if the following conditions are met:
Answer was 'Less than once a year' *or* '1-3 times a year' *or* '4-6 times a year' *or* 'More than 6 times a year' *or* 'Other' at question '8 [q7]' (How often do you use digital tools for cultural heritage?) *and* Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Please write your answer here:

How often do you visit cultural heritage sites?

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

❗ Choose one of the following answers
Please choose **only one** of the following:

- ◯ Never
- ◯ Less than once a year
- ◯ 1-3 times a year
- ◯ 4-6 times a year
- ◯ More than 6 times a year
- ◯ Other please specify
- ◯ Other

What primary purpose drives you to engage in cultural-heritage applications? *

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Choose one of the following answers
Please choose **only one** of the following:

- ◯ Educational
- ◯ Entertainment
- ◯ Places that I cannot visit physically
- ◯ Other please specify
- ◯ Other [ ]

Digital tools that permit present and manage cultural heritage information.

How frequently do you either visit cultural heritage sites or spend time learning about them?

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Choose one of the following answers
Please choose **only one** of the following:

- ◯ Never
- ◯ Less than once a year
- ◯ 1-3 times a year
- ◯ 4-6 times a year
- ◯ More than 6 times a year
- ◯ Other
- ◯ Other [ ]

When visiting a cultural heritage site, how do you prefer relevant information to be presented to you? Please rank the following options, starting with your preferred way:

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

❗ All your answers must be different and you must rank in order.
Please number each box in order of preference from 1 to 6

☐ Text
☐ Figures
☐ Tables
☐ Audio
☐ Video
☐ Explanation by human

For each of the following statements, please rate which apply to you 1 = Strongly Disagree.,2 = Disagree.,3 = Neither Agree nor Disagree.,4 = Agree.,5= Strongly Agree. *

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Please choose the appropriate response for each item:

	1	2	3	4	5
Feel overwhelmed by reading all the text	◯	◯	◯	◯	◯
Try to see everything the site has to offer	◯	◯	◯	◯	◯
Try to find out what part of the site I am interested in beforehand	◯	◯	◯	◯	◯
Stick to the suggested route of the site	◯	◯	◯	◯	◯
Look up further information about the site on my phone	◯	◯	◯	◯	◯

In the following, we will ask a few questions about using Augmented Reality glasses for cultural heritage. While wearing AR glasses, you can see digital objects (holograms) in your surroundings like this:

Real world view

Example 1: Digital objects added to real world view

Example 2: Digital objects added to real world view

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

❗ Choose one of the following answers
Please choose **only one** of the following:

◯ I have read the explanation about AR

What type of information about this large landmark would you like to reveal? Please rate your interest selecting from 1 to 5.

1. Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Please choose the appropriate response for each item:

	1	2	3	4	5
Previous / current use of landmark (e.g., 100 years ago)	◯	◯	◯	◯	◯
Previous / current inhabitants of landmark (e.g., 100 years ago)	◯	◯	◯	◯	◯
Previous appearance of landmark (e.g. 100 years ago)	◯	◯	◯	◯	◯
Date of construction	◯	◯	◯	◯	◯
Ownership of landmark	◯	◯	◯	◯	◯
Physical dimensions of landmark (construction cost, footprint area, shape)	◯	◯	◯	◯	◯
Architect of landmark	◯	◯	◯	◯	◯
Other landmarks of that architect	◯	◯	◯	◯	◯
Unique fact / information (if present) about POI	◯	◯	◯	◯	◯
Different rooms / spaces of that landmark	◯	◯	◯	◯	◯
(Currently hidden) entrances	◯	◯	◯	◯	◯

	1	2	3	4	5
Relevant historical events that happened here	◯	◯	◯	◯	◯

What is your preferred format for presenting information about the landmark?

Indicate your interest selecting from 1 to 5.

1. Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Please choose the appropriate response for each item:

	1	2	3	4	5
Via text presented next to the landmark	◯	◯	◯	◯	◯
Via text presented next to subparts of that landmark	◯	◯	◯	◯	◯
Via audio while looking at the landmark	◯	◯	◯	◯	◯
Via visualizations (like charts, pictures, ...)	◯	◯	◯	◯	◯

Would you like to receive comparative information, e.g. the size of the landmark compared to similar landmarks?

Indicate your interest selecting from 1 to 5.

1. Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Please choose **only one** of the following:

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5

What information about the monuments would you like to reveal? Indicate your interest selecting from 1 to 5. (1. Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree; 4. Agree, 5. Strongly Agree)

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Please choose the appropriate response for each item:

	1	2	3	4	5
Physical aspects (weight, material, size)	◯	◯	◯	◯	◯
Who created the monument?	◯	◯	◯	◯	◯
Other monuments of that creator	◯	◯	◯	◯	◯
Other places where a similar monument is located	◯	◯	◯	◯	◯
Unique fact / story about the monument	◯	◯	◯	◯	◯

What is the preferred format for presenting this information?

Indicate your interest selecting from 1 to 5.

1. Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Please choose the appropriate response for each item:

	1	2	3	4	5
Via text presented next to the monument	◯	◯	◯	◯	◯
Via audio while looking at the monument	◯	◯	◯	◯	◯
Via visualizations (like charts, pictures, …)	◯	◯	◯	◯	◯

When should information be presented?

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

❗ Choose one of the following answers
Please choose **only one** of the following:

◯ Upon request
◯ By moving closer to a monument
◯ Always visible on the screen
◯ Other

Would you like to receive comparative information, e.g. the material of the monument compared to similar monuments?

Indicate your interest selecting from 1 to 5.1. Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree; 4. Agree, 5. Strongly Agree

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Please choose **only one** of the following:

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5

What information about the urban infrastructure would you like to reveal?

Indicate your interest selecting from 1 to 5.

1. Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Please choose the appropriate response for each item:

	1	2	3	4	5
Past war damage of the environment	◯	◯	◯	◯	◯
Information about singular buildings / infrastructure (such as current usage, opening hours, architectural details)	◯	◯	◯	◯	◯
Planned changes in the environment	◯	◯	◯	◯	◯
Objects / landmarks that are occluded by the infrastructure	◯	◯	◯	◯	◯

What is the preferred format for presenting this information?

Indicate your interest selecting from 1 to 5.

1. Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Please choose the appropriate response for each item:

	1	2	3	4	5
Via text placed in the environment	◯	◯	◯	◯	◯
Via audio while looking at the environment	◯	◯	◯	◯	◯
Via visualizations (like charts, pictures, …)	◯	◯	◯	◯	◯

Would you like to receive comparative information, e.g., the war damage of the environment compared to the rest of the city or other cities?

Indicate your interest selecting from 1 to 5.

1. Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Please choose **only one** of the following:

◯ 1
◯ 2
◯ 3
◯ 4
◯ 5

How would you prefer to plan a route reflecting your personal interests? Please rank these approaches starting with putting the one you like most first.

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

❗ All your answers must be different and you must rank in order.
Please number each box in order of preference from 1 to 4

☐ By selecting POIs directly on an interactive map
☐ By searching and adding POIs from a list or search bar
☐ By setting a start and end point, then choosing POIs along the route
☐ By selecting suggested POI-based routes (e.g. popular tours or categories)

How would you prefer to access the routes?

*

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '1 [p1]' (To continue please agree with the privacy policy.)

Choose one of the following answers
Please choose **only one** of the following:

◯ Via a third-party application that you have to download to your private mobile phone

◯ Via a web browser

Thank you very much for your participation!

Submit your survey.
Thank you for completing this survey.