



User Experience on Augmented Reality Card Mobile Application for Promoting a Non-governmental Organization Services (ARCare4NGO)

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Abstract. This paper reports the ongoing project related to the development of ARCare4NGO mobile application for promoting NGO services. Nowadays, people might know about a Non-Governmental Organization (NGO) but did not know what services they had provided and where to donate the supplies. Besides, the awareness of helping disabilities is less. NGO also need donations to help them keep their organization active to continue to help the disabilities and unfortunate individuals. Therefore, ARCare4NGO had been developed and evaluated. This project was to develop the AR card mobile application to promote NGO services (ARCare4NGO) that can promote the NGO services successfully to the users. This could increase the awareness of caring and helping disabilities so that there are more new donors making donations. The proposed application also has been discussed in the previous paper which involves expert evaluation. To ensure the proposed application could fulfil the actual users' needs, user experience testing had been carried out and discussed in this paper. A set of questionnaires has been set up and distributed to the actual users upon they use the proposed ARCare4NGO. Overall, the findings of the study indicate that the ARCare4NGO is user friendly, easy to use, an interesting way to promote NGO services and able to evoke positive donations from users to the NGO.

Keywords: User Experience · Augmented Reality (AR) · AR Card Mobile Applications · ARCare4NGO · Non-Governmental Organization (NGO) · Disabilities

1 Introduction

In this advanced technology era, Augmented Reality (AR) has a big potential in the business field. It is being used on everything especially in marketing like promoting something. AR is an enhanced version of the real physical world by providing simulated physical control and environmental embedding instead of the interface that draws users away from the real world and towards the screen [2, 5]. It is achieved through the use of digital visual elements, sound or other sensory stimuli delivered via technology.

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A. Ismail et al. (Eds.): i-COME 2022, ASSEHR 769, pp. 531–544, 2023.

https://doi.org/10.2991/978-2-38476-098-5_46

There are a lot of disabilities and also underprivileged children and adults in the world. Its pre-eminent medical diagnosis in terms of individual pathology and accompanying deficits, abnormalities and functional limitations [1]. According to the statistics of disabilities registration in Malaysia (until January 2021), the total is 592,856 people including problems in vision, hearing, speech, physical, learning and mental. NGOs are essential civic actors in emergency and disaster response in societies, and they use social media to highlight major concerns and organize response efforts [7]. Even though NGOs' integration of the underprivileged was not up to standard, they still needed to reach out in a more efficient way to avoid isolating them in a certain location [6]. They help and serve communities in order to decrease disabilities and unfortunate individuals' burden.

Furthermore, there are a lot of people who might not actually know and understand the services that the NGO provides. Besides, they would like to donate but they do not know where and how to help the disabled and unfortunate persons. In addition, due to pandemic COVID-19, they are not suitable to organize some big programmes to collect the funds, supplies or promote their organization services. The impact is the less sponsor supplies for them. This causes them to not have enough funds or donations. They need funds or donations to support their organization and keep active and helping the underprivileged. But, it may also struggle to raise the funding from private sources [3].

Hence, this project's purpose is to create and develop an AR card mobile application for promoting NGO services (ARCare4NGO) to let more people know the existing NGO needs everybody's help to lessen the burden of disabilities and underprivileged. The name of the NGO is *Yayasan Orang Kurang Upaya Kelantan* (YOKUK). By using AR to promote in social media, it will enhance the user experience when using it and increase the awareness of the caring disabilities and underprivileged. And also, there will be more people to know the NGO, where the place is and understand what services they provide to help the disabilities and underprivileged. This is a great method to promote their services compared to waiting for the donors to sponsor. The proposed application also has been discussed in the previous paper which involves expert evaluation. To ensure the proposed application could fulfil the actual users' needs, user experience testing had been carried out and discussed in this paper.

Below are the examples of existing AR applications (Table 1) and the comparative analysis (Fig. 1) in triangle form between the previous applications and the ARCare4NGO that will be developed.

2 Methodology

Methodology referred to the theoretical justification of the research in a chosen discipline including axioms, beliefs, models and principles [4]. Based on Fig. 1, there were 2 phases that the researchers went through. The researchers began with the first phase which is conducting the user experience testing on ARCare4NGO. User experience is important to investigate the real demand and tasks of the users in the first design process, to ensure the high level of customer satisfaction, decrease user confirmation time and errors, and increase user productivity [9]. The user experience testing ins well

conducted in Phase 1. A total of 85 respondents who were involved in this user experience testing were public. The questionnaire was conducted to the respondents upon finishing using and experiencing the ARCare4NGO prototype (for android users) or watching a demonstration video on the application (for ios users). Then, the data was collected successfully and got the result of the user experience testing at the outcome of this phase.

Next, the second phase was analyzing the result of the user experience testing of ARCare4NGO application after gathering the data from the 85 respondents in the first phase. Then the outcome of this phase was the result analysis of user experience testing of ARCare4NGO application.

3 The Proposed Prototype

Below is the interface of ARCare4NGO. In the first interface of the AR app, it will display “SCAN HERE” to let the user know where to scan the Image tracker (YOKUK image logo card). Then, the user needs to use the image tracker to scan it. (Fig. 3).

After that, it will display the AR Logo card of YOKUK together with the buttons (Fig. 4). The user can click the Info button to view and scroll the short introduction of YOKUK (Fig. 5). Next, the user can click the Image button to see the activity images of the services that YOKUK provided by clicking the next, previous buttons or sliding the image (Fig. 6). Besides, the user also can watch the video of YOKUK by clicking the

Table 1. The examples of existing AR application

Application	Description	Advantages	Disadvantages
Virtual Blood Donation	This Virtual Blood Donation is a campaign created by 23red and won an annual digital outdoor advertising competition run by Ocean Outdoor. This campaign is to raise awareness of the life-saving power of blood donation and encourage people to donate their blood with an augmented reality app that links to the outdoor large advertising screens representation of an empty blood bag and a sick patient via an iPhone [10].	<ul style="list-style-type: none"> - User friendly AR application - A very clean and nice animation and interface. Triggers the blood bag to fill (time: 20 s) and the sick patient to be transformed to looking well. 	<ul style="list-style-type: none"> - Lack of interaction with users. Only an animation scan and fill the blood bag. - No images or videos for more information about blood donation. - Only can be used for IOS device

(continued)

Table 1. (continued)

Application	Description	Advantages	Disadvantages
AR Print Christmas Card	AR Print Christmas Card is an AR charity donation card. It is a Christmas Augmented Reality project for JELGAVAS TIPOGRÁFIJA to promote the charity and increase the awareness of donations. It uses Overly app to scan the Christmas Card, then it plays a video about a story of a company spreading Christmas Magic to SOS Latvia Children’s Villages. It also featured a donation button to let the user donate their money to the youth charity in a second.	<ul style="list-style-type: none"> - User friendly AR application - Has a functional button - Can be used for both android and ios devices because it can be downloaded on Play Store or apple store. 	<ul style="list-style-type: none"> - Only a video is presented. - Lack of multimedia elements.
AR Brochure for Alnwick Garden	This AR brochure for Alnwick Garden is an AR app that was created by Aircards. It is to promote the unique UK tourist attraction. It provided a video in the brochure to show the beautiful scenery in Alnwick Garden to the user. Besides, it also provided a “LEARN MORE” button at the bottom right of the AR app to navigate the user to go to their website to book for a ticket via online.	<ul style="list-style-type: none"> - User friendly AR application - Can be used in both devices which are android and IOS - Have interaction between the user and the application. 	<ul style="list-style-type: none"> - Only a video is presented. - Lack of multimedia elements.



Fig. 1. Comparative analysis

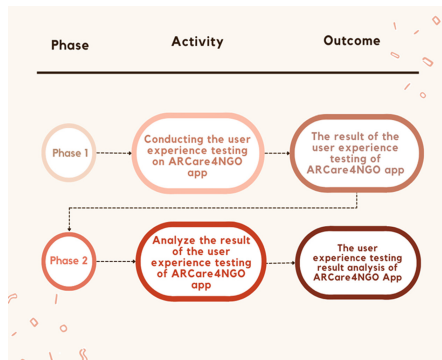


Fig. 2. Research methodology

video icon button (Fig. 7). Furthermore, there is a Donate Now button in blue colour to bring the user to the donation web page directly. Moreover, the user can contact YOKUK directly by clicking the Call and Email icon button. The user also can click the Map icon button to view where the YOKUK is located. In addition, the user also can click the social media buttons (Facebook, Instagram and YOKUK Official Website) to access YOKUK social media platforms.

4 Finding and Discussion

Below are the results in this finding and discussion. A total of 85 respondents had participated in this survey and mostly were Chinese, female, occupied degree students. The results had been divided into 4 parts which are design and content, function, user experience and satisfaction and suggestion. Each result would be presented in tables and graphs.

4.1 Section A: Design and Content

This section is about the design and content in this ARCare4NGO mobile application.

According to Table 2 and Fig. 8, most of the respondents strongly agreed that the design of this AR app is clean and neat, which was 53 respondents (62.4%) followed by 26 respondents (30.6%) who agreed with this statement. There was only 1 respondent (1.2%) who disagreed and 5 respondents (5.9%) were neutral about this statement respectively. No respondents who strongly disagreed about this statement. Overall, the mean of the statement is 4.5.



Fig. 3. Scanning part

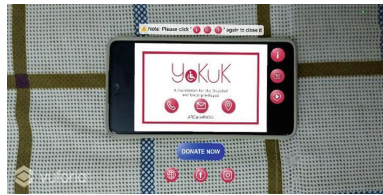


Fig. 4. AR part - AR card



Fig. 5. AR part - Introduction of YOKUK

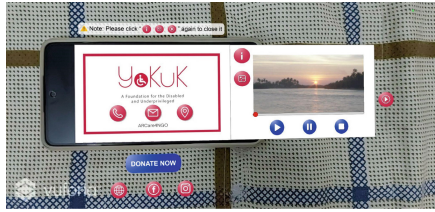


Fig. 6. AR part - Images that showed the services that provided by YOKUK

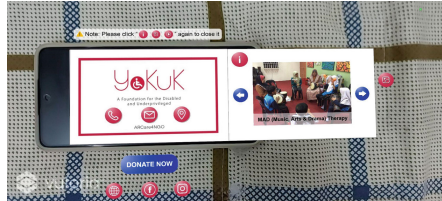


Fig. 7. AR Part - Video of YOKUK

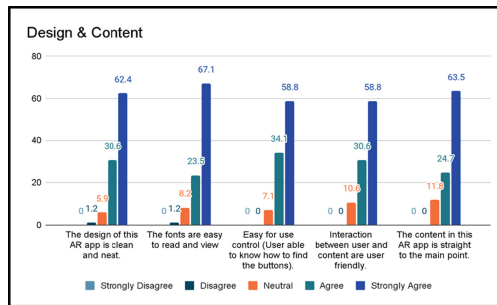


Fig. 8. Design & content

Next, for statement 2, the highest number of respondents is 57 respondents (67.1%) who strongly agreed that the fonts are easy to read and view. There was not any respondent strongly disagreeing with the statement while only 1 respondent (1.2%) disagreed with it. 27 respondents (23.5%) agreed and 7 respondents (8.2%) were neutral with the statement respectively. Overall, the mean of the second statement is 4.6. From this data to see, it proved that the font size and font type used in the ARCare4NGO is good to view and read. The wrong or unsuitable font size and font type could cause the users to give up on using the application [8].

Moreover, for statement 3, the majority of the respondents strongly agreed ARCare4NGO is easy to control which were 50 respondents (58.8%). There were 29 respondents (34.1%) who agreed and 7 respondents (8.2%) neutral with this statement. There were no respondents “Disagree” and “Strongly Disagree” on this statement. The mean of this statement is 4.5 which stated most of them strongly agreed ARCare4NGO is easy for user control.

Table 2. Design and Content Statements

No.	Statements	1		2		3		4		5		Mean
		f	%	f	%	f	%	f	%	f	%	
1	The design of this AR app is clean and neat.	0	0	1	1.2	5	5.9	26	30.6	53	62.4	4.5
2	The fonts are easy to read and view.	0	0	1	1.2	7	8.2	20	23.5	57	67.1	4.6
3	Easy for use control (User able to know how to find the buttons).	0	0	0	0	6	7.1	29	34.1	50	58.8	4.5
4	Interaction between user and content are user friendly.	0	0	0	0	9	10.6	26	30.6	50	58.8	4.5
5	The content in this AR app is straight to the main point.	0	0	0	0	10	11.8	21	24.7	54	63.5	4.5

* Scale

1 - Strongly Disagree 2 – Disagree 3 – Neutral 4 – Agree 5 - Strongly Disagree

Furthermore, for statement 4, the highest number of respondents is 50 respondents (58.8%) who strongly agreed that “Interaction between user and content are user friendly.”. There were 26 respondents (30.6%) who agreed which was the second highest on this statement and only 9 respondents (10.6%) were neutral about this statement respectively. There was no one who disagreed and strongly disagreed on this statement. The mean of this statement is 4.5.

Lastly, for the fifth statement, the majority of the respondents strongly agreed that “The content in this AR app is straight to the main point.” which was 53 respondents (63.5%). There were no respondents who disagreed and strongly disagreed on this statement. There were 10 respondents (11.8%) neutral about this statement while 21 respondents (24.7%) agreed about this statement. The mean of this statement is 4.5.

4.2 Section B: Function

This section is about the function in ARCare4NGO.

Based on Table 3 and Fig. 9, the results showed that 60 respondents (70.6%) strongly agreed that this AR app is able to scan the image. Next, there were 18 respondents (21.2%) who agreed and 7 respondents (8.2%) are neutral to this statement. There were

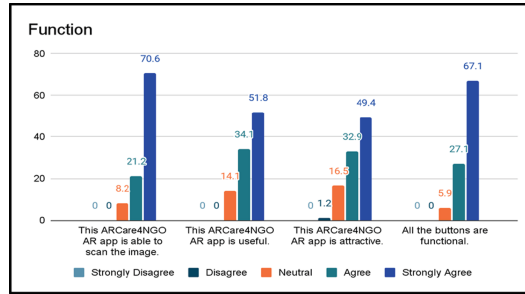


Fig. 9. Function

Table 3. Function statements

No.	Statements	1		2		3		4		5		Mean
		f	%	f	%	f	%	f	%	f	%	
1	This ARCare4NGO AR app is able to scan the image.	0	0	0	0	7	8.2	18	21.2	60	70.6	4.6
2	This ARCare4NGO AR app is useful.	0	0	0	0	12	14.1	29	34.1	44	51.8	4.4
3	This ARCare4NGO AR app is attractive.	0	0	1	1.2	14	16.5	28	32.9	42	49.4	4.3
4	All the buttons are functional.	0	0	0	0	5	5.9	23	27.1	57	67.1	4.6

* Scale

1 - Strongly Disagree 2 – Disagree 3 – Neutral 4 – Agree 5 - Strongly Disagree

no respondents who disagreed and strongly disagreed with this statement. The mean for this statement is 4.6.

Besides, 44 respondents (51.8%) strongly agreed that this ARCare4NGO is useful. Then, there were 29 respondents (34.1%) who agreed and only 12 respondents (14.1%) voted neutral for this statement. There was no respondent who disagreed and strongly disagreed with this statement. The mean for Statement 2 is 4.4.

Furthermore, there were 42 respondents (49.4%) strongly agreed, 28 respondents (32.9%) agreed and 14 respondents (16.5%) neutral about “This ARCare4NGO AR app is attractive.”. There was only 1 respondent (1.2%) who disagreed and no respondents strongly disagreed with this statement. The mean for this Statement is 4.3.

Moreover, for statement 4, there are 57 respondents (67.1%) strongly agreed that all the buttons are functional. Next, 23 respondents (27.1%) agreed and there were only 5 respondents (5.9%) neutral about this statement. There were no respondents who disagreed or strongly disagreed with this statement. The mean for this Statement 4 is 4.6.

4.3 Section C: User Experience and Satisfaction

This section is about the user experience and satisfaction on the ARCare4NGO mobile application.

According to Table 4 and Fig. 10 the User Experience and Satisfaction result showed that Statement 1, 43 respondents (50.6%) strongly.

agreed that they would like to share ARCare4NGO with their family and friends. There were 27 respondents (31.8%) agreed followed by 13 respondents (15.3%) neutral with this statement. There was only 1 respondent who disagreed and strongly disagreed with this statement respectively. The mean of this statement is 4.3.

Furthermore, the results showed that 41 respondents (48.2%) strongly agreed with the statement 2 “I would like to use this AR app in the future.”. There were 27 respondents (31.8%) who agreed with the statement followed by 14 respondents (16.5%) neutral about the statement 2. There were only 2 respondents (2.4%) who disagreed and 1 respondent (1.2%) strongly disagreed with the statement. The mean for this statement is 4.2.

Besides, for statement 3, 54 respondents (63.5%) strongly agreed that this AR app lets them know more about YOKUK. Next, there were 24 respondents (28.2%) who agreed with this statement followed by 7 respondents (8.2%) and there was no respondent who disagreed and strongly disagreed with this statement. The mean for this statement is 4.6.

Moreover, there were 48 respondents (56.5%) strongly agreed that this AR app helped them a lot because they can contact YOKUK easily followed by 28 respondents (32.9%) agreed, 8 respondents (9.4%) stayed neutral and only 1 respondent (1.2%)

disagreed with this statement. None of the respondents strongly disagreed with the statement. The mean for this statement is 4.4.

In addition, 43 respondents (50.6%) strongly agreed that the content makes them want to make a donation for YOKUK. 24 respondents (28.2%) agreed with this statement followed by 18 respondents (21.2%) neutral about this statement. There was no

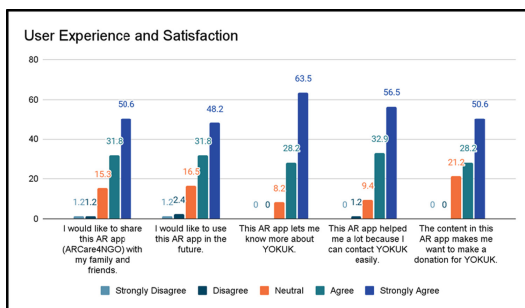


Fig. 10. User Experience and Satisfaction

Table 4. User Experience and Satisfaction Statements

No.	Statements	1		2		3		4		5		Mean
		<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	
1	I would like to share this AR app (ARCare4NGO) with my family and friends.	1	1.2	1	1.2	13	15.3	27	31.8	43	50.6	4.3
2	I would like to use this AR app in the future.	1	1.2	2	2.4	14	16.5	27	31.8	41	48.2	4.2
3	This AR app lets me know more about YOKUK.	0	0	0	0	7	8.2	24	28.2	54	63.5	4.6
4	This AR app helped me a lot because I can contact YOKUK easily.	0	0	1	1.2	8	9.4	28	32.9	48	56.5	4.4
5.	The content in this AR app makes me want to make a donation for YOKUK.	0	0	0	0	18	21.2	24	28.2	43	50.6	4.3

* Scale 1 - Strongly Disagree 2 – Disagree 3 – Neutral 4 – Agree 5 - Strongly Disagree

respondent who disagreed and strongly disagreed with this statement. The mean for this statement is 4.3.

4.4 Section D: Suggestion

This section is about the suggestions from the users after experiencing the ARCare4NGO that can improve to be better. The qualified and valued suggestion would be selected from the 85 respondents in the survey.

There were many different suggestions that were suggested by the respondents. The developers had reviewed and filtered out the valued suggestion. Most of the respondents replied “No”, “Good enough” and “Good development” for the suggestions to improve the ARCare4NGO.

However, no one application is perfect and always fits with others. That’s the reason for doing user experience testing. The first suggestion that the developers had collected in the questionnaire was this app could be designed better. From this suggestion, the interface design of the ARCare4NGO is too simple. The colour could be added more to look more fabulous and interesting on the design look. Another one respondent explained that ARCare4NGO could add the animation after scanning the YOKUK Logo Card

Table 5. Suggestions from users

No.	Suggestions
1.	No
2.	Good enough
3.	Good development
4.	Overall good. But I think the application is a bit monotonous, I hope this app can be designed better.
5.	In my opinion, I think the background is too empty it is too clear and look too simple, may be can add some texture design (shape, line, or any other design)
6.	The interface in aspect of typesetting can still have improvement like leaving more white space so that it will not too pack
7.	Can add on 'news' or 'latest update' section for better engagement with the users
8.	Include share link button for the application
9.	For the feedback function, it can be improved as it is lacking the some point

successfully. For example, the transition of appearing the AR logo card or animation of popping out the AR logo card.

Next, the second suggestion was adding some texture design to the background because the background is too simple. They hoped the developers could draw some texture or add shadow on the white background to look more layered and quality.

Furthermore, "The interface in aspect of typesetting can still have improvement like leaving more white space so that it will not too pack" was the third qualified suggestion that would be considered to improve this application. The margin of the text is quite small for the respondent. Margin of the white background is suggested to be bigger.

Moreover, another one suggestion is about the content. The respondent suggested adding the news of YOKOK or the latest update of YOKUK for a better engagement with the users. In addition, there was a respondent who suggested adding a share link button to let the users share the application with their family and friends easily.

Lastly, the last suggestion was "For the feedback function, it can be improved as it is lacking at some point" which means that the feedback of the buttons does not bring a big effect on the users. He or she suggested changing the feedback of the button so that when clicking the buttons, the button would become bigger than the button which before clicking.

5 Conclusions

In a nutshell, ARCare4NGO is an interesting AR card mobile application to promote YOKUK. This is because AR is becoming a trend in this new generation. This AR card mobile application is useful for the users, especially the donors who wish to donate and help the NGO. The ARCare4NGO not only can let the user know more about YOKUK by viewing the short introduction, images and video of YOKUK through this AR card

mobile application but also can donate their funds to YOKUK easily by clicking the “Donate Now” button at the same time.

Based on the result, most of the respondents were satisfied with the ARCar4NGO and had good feedback about it on section A, section B and section C. In section D, there were some suggestions from the users that could be improved on the interface and the content of the application. For the interface, it is too simple and clean for them, the feedback of the buttons, the text margin, adding animation or transition after scanning successfully. The suggestion in the content was to add the latest news of YOKUK and add a new button for sharing the ARCare4NGO easily.

Acknowledgment. The special recognition goes to School of Technology Multimedia, Universiti Utara Malaysia for sponsoring this paper. Special thanks to *Yayasan Orang Kurang Upaya Kelantan* (YOKUK) for contribution to this study and all the experts who provides the valuable comments that greatly enhanced the quality of this research.

References

1. Barnes, C., & Mercer, G.. Exploring disability. *Polity*. 2010.
2. Billinghurst, M.. Augmented reality in education. *New horizons for learning*, 2002, 12(5), pp. 1-5.
3. Corlett, R. T., Primack, R. B., Devictor, V., Maas, B., Goswami, V. R., Bates, A. E., ... & Roth, R. (2020). Impacts of the coronavirus pandemic on biodiversity conservation. *Biological conservation*, 246, 108571.
4. Hameed, H. (2020). Quantitative and qualitative research methods: Considerations and issues in qualitative research. *The Maldives National Journal of Research*, 8(1), 8-17.
5. Hilken, T., de Ruyter, K., Chylinski, M., Mahr, D., & Keeling, D. I. (2017). Augmenting the eye of the beholder: exploring the strategic potential of augmented reality to enhance
6. online service experiences. *Journal of the Academy of Marketing Science*, 45(6), 884–905.
7. Kunapalan, H., Ismail, N. B., & Yatiban, A. B. The Roles of Non-Governmental Organisations (NGOs) in Assisting Refugees: From Malaysia Context. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 2020, 5(5), 89-94.
8. Li, Y., Shin, J., Sun, J., Kim, H. M., Qu, Y., & Yang, A. Organizational sensemaking in tough times: The ecology of NGOs’ COVID-19 issue discourse communities on socialmedia. *Computers in Human Behavior*, 2021, 122, 106838.
9. Mathieu. (2019, July 25). *Why Typography Plays An Important Role in The Mobile User Experience*. Guarana Technologies. Retrieved June 26, 2022, from <https://www.guarana-technologies.com/user-experience/typography/>
10. Niranjanamurthy, M., Nagaraj, A., Gattu, H., & Shetty, P. K. Research study on importance of usability testing/User Experience (UX) testing. *International Journal of Computer Science and Mobile Computing, IJCSMC*, 2014. 3(10), pp. 78-85.
11. Thomas, D. J. Computer-aided medicine revolution. *ITNOW*, 2016. 58(4), 40-41.

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