

## Blood donation support application: contributions from experts on the tool's functionality

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**Abstract** *Blood donation is a social practice that helps treat diseases and maintain public health. The DoeSangue application was designed and developed to support donor recruitment and loyalty, strengthening health promotion and social engagement. We aimed to assess the DoeSangue application from the perspective of hematology and hemotherapy experts. A methodological, applied and qualitative research was carried out from September 2015 to July 2017 in Fortaleza, Ceará. The study was based on Participatory Interaction Design associated with Symbolic Interactionism. After conducting the first two steps, application design and development in a laboratory and assessment by donor users, the application was validated by eight experts from the Fortaleza's public blood center. For data collection, the 'application validation form with experts' was used based on a Likert-type scale, and a focus group was conducted. The tool was positively assessed by participants, with an average Content Validation Index of 0.88. Evaluators pointed out, among other features, the tool's ability to promote interactivity, mobilization and social engagement, in addition to contributing to gathering and loyalty of blood donors.*

**Key words** *Blood donos, Technology, Health promotion, Qualitative research*

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## Introduction

Blood donation saves millions of lives every year. It can help patients with cancer treatments, premature newborns, pregnant women at high risk, hematological patients who need transfusion therapy, injured and with potentially fatal diseases, in addition to supporting complex medical and surgical procedures.

Blood donation, within the equity principle, represents a great social movement of solidarity exchanges and maintenance of life through voluntary, altruistic and free from prejudice actions. Accessing blood therapy and blood by-products corresponds to one of the strategies aimed at equity in health care for the population, being an essential component of effective health systems<sup>1</sup>.

In many countries, demand for blood and blood products exceeds supply and services face the challenge of making them available sufficiently, in addition to ensuring their quality and safety<sup>2</sup>. Adequate supply can only be ensured through regular voluntary and unpaid donations. In this context, technological advances in health, from the introduction and expansion of eHealth technologies, have contributed substantially to accessibility to information and services, strengthening the health system and meeting the prerequisites of equity and social justice. This also applies to initiatives aimed at gathering and maintaining blood donors.

Brazilian hemotherapeutic assistance has a network of blood centers, headquartered in all states and in the federal district, comprising 32 coordinating blood centers and 2,066 hemotherapy services in the Unified Health System (SUS – *Sistema Único de Saúde*)<sup>3</sup>. According to the Ministry of Health<sup>3</sup>, only 1.6% of the Brazilian population donates blood. The percentage of donors in the country meets the World Health Organization (WHO) parameters, which stipulates a margin of 1% to 3% of blood donors. In 2018, 3.3 million people donated blood in Brazil, 60% of which were male, and 2.8 million people needed to receive blood transfusions<sup>4</sup>.

Blood donation is a social strategy for maintaining public health and must be exercised voluntarily, altruistically and anonymously, as required by Brazilian law and WHO<sup>5</sup>. It is also the realization of social integration in public health actions, consciously and effectively. A blood supply consistent with population needs helps to reduce mortality and clinical complications.

Hemotherapy services exhaustively seek new marketing and health communication strategies

that enable blood supply maintenance, guaranteeing satisfactory service to the population, generating safety to health units and the recovery of patients. Thus, it is believed that using mobile technologies in health (mHealth) can increase capillarity in the population with regard to blood donation, favoring gathering and loyalty of donors. Moreover, mHealth technologies meet the diverse desires and needs of users, generating adherence to self-care with health, social involvement in humanitarian issues in support of patients, search for well-being and quality of life<sup>6</sup>.

In order to meet Ceará's public blood center's needs, the *DoeSangue* application was designed and developed at *Universidade de Fortaleza* (UNIFOR), municipality of Fortaleza, state of Ceará, by a multidisciplinary team in partnership between the Graduate Program in Public Health and Information Technology Application Center Innovation Laboratory (NATI (*Núcleo de Aplicação em Tecnologia da Informação*)/UNIFOR).

The tool has features and characteristics that aim to fill the communication gap between the blood center and donor and/or citizen. The application was duly tested by donors who participated in the usability test, who assessed it in a positive way and gave suggestions for the improvement of some features, such as speeding up the scheduling of blood donation by the application, improving the cursor display in some application screens and fix the system crash that caused the application to exit when 'Back' is selected. Then, adjustments were made to the tool, which justifies a need for new testing and assessment by experts.

Given the above, this study aims to assess *DoeSangue* from the perspective of hematology and hemotherapy experts.

## Method

A methodological research was carried out, of an applied nature and a qualitative approach, which was based on the method of creation of Interaction Design (ID)<sup>7</sup>, supported by Symbolic Interactionism (SI)<sup>8</sup>.

ID<sup>7</sup> favors using technological, pervasive and interactive resources, constituting a multidisciplinary field of study. This method supported the guiding questions for *DoeSangue's* conception, development and validation within the principle of continuous improvement. SI<sup>8</sup>, in turn, supported interpretation of meanings attributed to *DoeSangue* interface in all tests performed and

enabled understanding experts' meanings, actions and interpretations during the tool validation test and in the focus group.

Considering the objective proposed in this study, it was felt the need to unite the two fields of knowledge for a deeper understanding of technological language, of analysis of senses and meanings, of the tool's interactive improvement, valuing experts' perspectives and ideal communication aiming at adequate performance for access to information.

Methodologically, Rogers et al.<sup>7</sup> define four phases for the construction of user-centered ID based on an iterative process: requirements gathering and identification of users' needs, design of alternatives and prototype (re) design construction, and assessment. This process is characterized as iterative due to a product's inability to emerge ready to use in one go, requiring comings and goings, exchange of experiences, assessments and tests so that the cycle is complete and allows continuous improvements<sup>7,9</sup>. These phases are complementary and can be accessed several times until product excellence is achieved.

The research was developed in three stages. The first occurred from September 2015 to July 2016, when the literature review, design and development of *DoeSangue* was carried out at NATI Innovation Laboratory at UNIFOR. Benchmarking<sup>10</sup> was adopted for screening, in Google Play (Android) and Apple Store (iOS) application stores, of technologies with similar content and directly related to blood donation. Twenty-four applications were identified in English and Portuguese from this action, but only 14 applications were directly related to the required product and technology.

After surveying functionality requirements in the 14 selected applications, 10 requirements were identified related to users' and the participating blood center's needs in this study. Another six requirements (6, 8, 9, 11, 14 and 16) were not identified in the existing applications, having been proposed and developed by the researchers of this study, as shown in Chart 1.

Six requirements (37%), among the 16 in Chart 1, were proposed as innovative resources (6, 8, 9, 11, 14 and 16). These requirements are related to donor acquisition, interaction and loyalty strategies, making *DoeSangue* differentials.

In this step, the first three steps of the User-Centered ID life cycle<sup>7</sup> interactive processes were contemplated: requirements gathering and identification of users' needs; design of alternatives and (re) design; prototype construction.

The second stage (November 2016) included the usability test, with assessment of the tool's performance and interaction of blood donors with technology. Eleven volunteer donors, aged 18 to 69 years, participated in the test. The test was carried out at NATI/UNIFOR, without external interference and with video recording; a User Performance Assessment Form was applied to monitor and measure the participants' performance, calculating the duration of each task, the difficulties encountered, possible doubts, ease in navigating the screens, efficiency and satisfaction of those present. At the end, participants completed the Post-Test Usability Questionnaire - Donor, which made it possible to analyze Human-Computer Interaction (IHC) and identify DI's effectiveness and the performance of *DoeSangue*.

The third stage, the object of this article, took place in July 2017, when the application was validated by experts. The tool was subjected to a functionality and content assessment by eight professionals in the field of hematology and hemotherapy, aiming to ensure coherence of information, alignment with the target audience and effectiveness. The test was applied in a controlled, quiet and distraction-free environment (NATI Technological Innovation Laboratory)<sup>11</sup>, lasting approximately two and a half hours.

In compliance with the guidelines suggested by Rogers et al.<sup>7</sup>, the research followed the following path: brief presentation about the study; video recording of the test to ensure registration of participants' expressions and actions; signing the Informed Consent Form; filling in the *DoeSangue* Validation Form by experts.

The Application Validation Form with experts was based on a Likert scale<sup>12</sup>, a tool widely used in sociology, psychology and administration to measure attitudes and behavior, divided into three assessment blocks: Block 1 - application objectives (9 assessment items); Block 2 - structure and presentation (15 assessment items); and Block 3 - technology relevance (5 assessment items). In this study, Likert-type scale items were graded from 1 to 4, with a score of 1 attributed to the worst assessment and 4 to the best, having been calculated based on the Content Validation Index (CVI).

CVI identifies the number of items on a Likert-type scale that received '3' and '4' scores within the total universe of responses. A score of 3 means that the tool is suitable and a score of 4, totally adequate<sup>12</sup>. From participants' responses, CVI calculation is based on the following formu-

**Chart 1.** Requirements for DoeSangue, Fortaleza, Ceará, 2016.

1. Registering donors;	9. Allowing posting of awareness videos and statements in the application (*);
2. Scheduling blood donation;	10. Providing information about blood centers (location, contacts, opening hours);
3. Identifying unfitness for blood donation and informing these donors;	11. Allowing registration in Blood Center Relationship Programs (*);
4. Calculating and remembering the next blood donation's date;	12. Adopting gamification features in the app - points, badges (symbols), among others – and a persuasive design;
5. Presenting the collection site closest to donors;	13. Offering notification features;
6. Carrying out an invitation to donate blood, by blood type, by location and in situations of rare phenotypes (*);	14. Providing reports of serological exam results (negative results) after donation (*);
7. Enabling donors to send an invitation to friends to be donors;	15. Offering information on automated donation, special donations (autologous) and clarification on myths and frequently asked questions;
8. Providing continuous communication with citizens in the aspect of social responsibility, campaigns and events, through short messages (*);	16. Integrating the application with the blood center database (*).

Source: Authors' creation (2017).

(\*) Requirements not identified in existing applications.

la: CVI = number of responses '3' or '4' divided by the total number of responses.

Final CVI values range from 0 to 1, in which values equal to or above 0.79 attest to the technology's validity<sup>13</sup>. Values below 0.79 denote the need for adjustments to the tool, block or item that received this score.

After the validation test, experts felt the need to express themselves and deepen the reflections on the tool a little more, given the relevance of technology to donor recruitment. For this reason, a focus group (FG)<sup>14</sup> was held five days after the validation test.

FG took place at the blood center's headquarters, in Fortaleza, Ceará, in July 2017, and was attended by seven of the eight experts who composed the validation test. Data collection technique is widely used in qualitative research, being appropriate for gathering perceptions and opinions about a situation or product of common interest to the group<sup>14</sup>. In health research, FGs are able to bring together several fields of knowledge in the interpretation of data and provide group interaction, while considering individual intervention in the collective.

FG was conducted by a moderator and three observers, having been recorded on video and audio to ensure registration of information. All participants contributed with in-depth opinions

and reports on the subject, with the debate being guided by a script called 'Guiding Questions for FG, which dealt with the application's contributions to the practice of blood donation; the tool's importance to increase donor recruitment; experts' perceptions of language, structure, content and bonus resources, among other aspects.

The qualitative data obtained in the third stage, the video recording in the validation test and FG were analyzed based on thematic content analysis<sup>15</sup>, going through pre-analysis, material exploration, treatment of results and interpretation<sup>16</sup>.

The data obtained from the validation test and the FG carried out with experts resulted in organization of content in two themes, namely: *Achieving the application's objectives, structure and functionality from experts' perceptions; Relevance of the application: what experts say.*

Then, treatment and interpretation of results made it possible to elaborate a synthesis of findings, establishing a dialogue between the identified themes, objective, study's assumptions and alignment with the scientific literature. Inferences and interpretations were made about experts' perceptions about *DoeSangue*.

To preserve participants' identities, letter "E" was used followed by numbers from 1 to 7. Thus, E1 represents expert 1 and so forth.

The results of this research have been recognized in the scientific community<sup>17</sup>. It is worth mentioning that the research's ethical-legal procedures followed the rules provided for in Resolution 466 of December 12, 2012 of the Brazilian National Health Council (CNS – *Conselho Nacional de Saúde*)<sup>18</sup>. It is noteworthy that this research was approved by the Ethics Committee of UNIFOR.

## Results and discussion

Four doctors, 2 nurses, 1 social worker and 1 occupational therapist participated in the validation of *DoeSangue*. Experts work specifically in the process of attracting and retaining blood donors (3), in blood processing (1), in transfusion medicine (2), in the traceability and surveillance of transfusion (1) and in the general direction of blood center (1). These were gathered at a public blood center according to the degree of technical knowledge, time of experience in the field, interest and availability to collaborate with the study.

Nielsen and Mack<sup>19</sup> points out that the number of participants in validation tests must be at least three and at most five. It should be noted, however, that there is no parameterization or consensus on this quantity in the literature. Cockton and Woolrych<sup>20</sup> argue that the number of experts in this test depends on the type of problem and the complexity of the artifact. Thus, including eight experts in the test in question is in line with that advocated by Dumas and Redish<sup>21</sup>.

*Achieving the application's objectives, structure and functionality from experts' perceptions and Relevance of the application: what experts say* reflects the application's contributions to the tool's functionality.

### Achieving the application's objectives, structure and functionality from experts' perceptions

The work developed culminated in inclusion and application of twelve interfaces, as shown in Figure 1, whose functionalities were assessed by experts.

After answering the questions proposed in the application validation form based on a Likert scale, experts scored and made observations and suggestions relevant to the qualitative analysis, the results of which are shown below.

Block 1 - objectives (Table 1) obtained an average CVI of 0.88. This results shows that *Doe-*

*Sangue* is able to achieve its purposes, goals or ends, from its use. However, items 1 and 2 were classified as below the acceptable CVI, 0.63 and 0.75, respectively, which shows the need to adapt the language used in the application to be closer to the target audience (donors and potential donors). They consider, with the assessment of item 2, the need to make the information better sized for guidance in the blood donation process, as well as for clarification of the target audience's doubts. These aspects deserve attention and concern *DoeSangue's* content and its objectivity, which leads to future adjustments in the tool, taking into account the iterativity principle of User-Centered Participatory ID<sup>7</sup>.

Experts pointed out that the information about restrictions and temporary and/or definitive impediments to make a blood donation must be reported by the blood center's professional who performs clinical screening. Therefore, they suggested removing it from the app's content. Evaluators' arguments are based on Ministerial Ordinance 158/2016, which guides blood donation, an extremely important step that aims to minimize the risk of contamination of patients through blood transfusion<sup>22</sup>. Experts argue that the population interested in donating needs to be informed about the blood donation process, as expressed by E1:

*... by placing the criterion directly [in the application], if you can and if you cannot [donate], you start giving information that donors can manipulate as well as you can outdate [the application] ... the concern is in the effectiveness of the information both for the population and for the blood center ... there are people who learn [the information] and respond ... manipulating. (E1)*

In addition to taking care of transfusion safety, participants pointed out that excess information can discourage the candidate from going to the blood center, since he will have access to the causes of disability before applying for the donation. They pointed out that the interesting thing is that:

*"...do not stop him from coming to the health service ... it is in the screening that he will know whether or not he can [donate] ... so, seek the health service, seek the blood center, already makes us work in this donor..." (E4).*

This fact also makes it possible for the blood center team to guide donors to seek another health service for any follow-up that may be needed.

Bonus resources offered by application to each task performed by users reached a max-

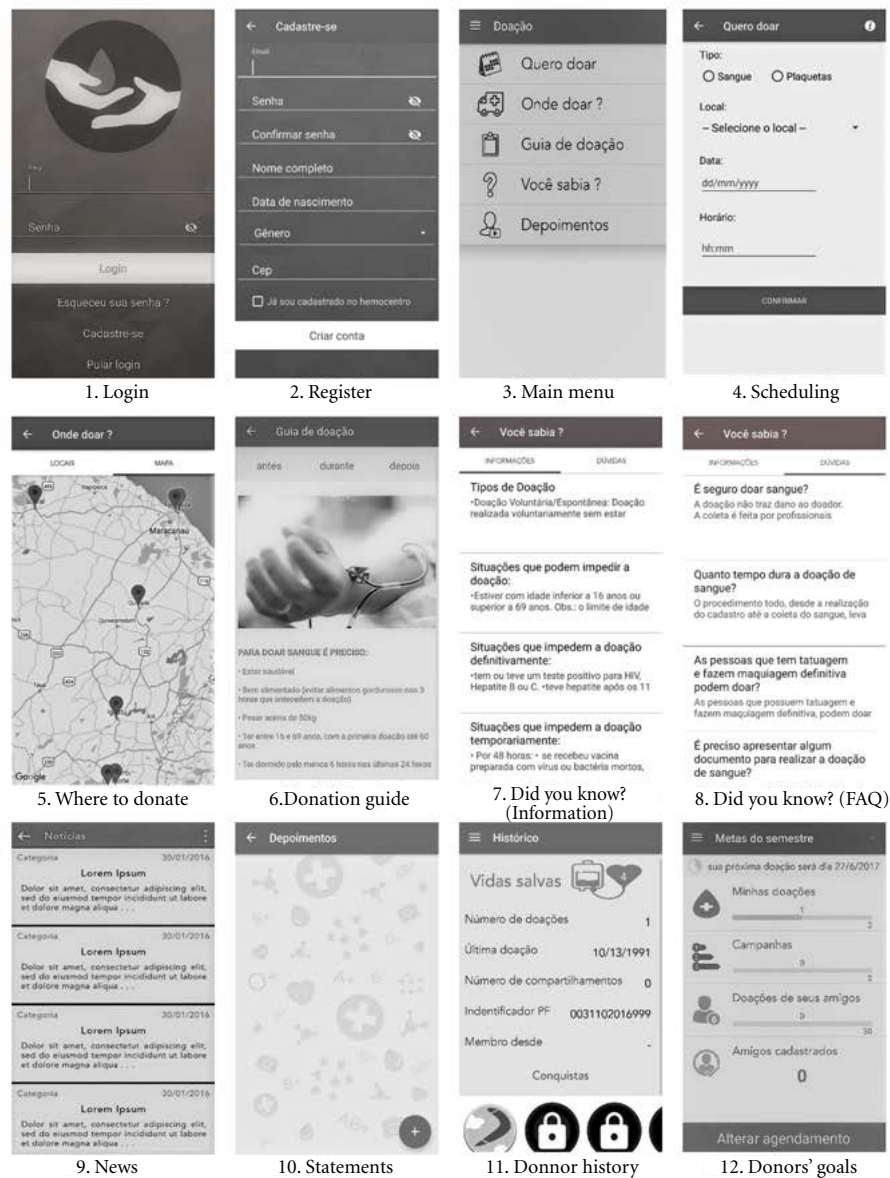


Figure 1. Illustration of DoeSangue.

Source: NATI/UNIFOR (2016).

imum score (CVI 1.0); this is recognized as a strategy for attracting blood donors with vast power of social engagement, therefore, of direct interest to Ceará's blood center and, possibly, of other blood centers in the country.

*Bonus is the maximum positive point [of the application], very good indeed! [...] (E4)*

*Having your donation score, having your friends' scores, you realize that you are doing good regardless of your presence, and there are other people doing good, it's very rewarding ... another good thing is to be able to interact with friends. (E8)*

Gamification, according to Kapp<sup>23</sup>, is characterized by the high power of engagement of peo-

**Table 1.** Content Validation Index (CVI) regarding analysis of objectives of DoeSangue.

Objectives	CVI
1. Language used is compatible with the target audience (donors and potential donors).	0.63
2. The information is adequate for guidance in the blood donation process as well as clarification of the target audience's doubts.	0.75
3. The strategies proposed for blood donation by users are consistent and effective in this process.	0.88
4. The proposed strategy of access to personalized donor information - such as the last donation date, blood type, number of donations made, access to test results, among others - are presented as a valid strategy.	0.88
5. The features offered can generate commitment the target audience commitment with maintaining the blood center's blood stock.	0.88
6. Content is interesting and can generate interest for users to keep the application installed on their phones.	0.88
7. The bonus feature can generate user engagement with the theme of blood donation.	1.0
8. The bonus feature can support blood centers in disseminating campaigns and disclosing news relevant to the target audience.	1.0
9. The application can generate interest in blood centers to use as a tool to gather blood donors.	1.0
CVI average	0.88

Source: Own authorship (2017).

ple through mechanical, intuitive and symbolic resources that can contribute to the learning, involvement and dissemination of information; they follow the path from assimilation to action and become part of an undeclared social movement, being able to extend this path to the summit of apologizing to an idea, product, service or cause.

Concerning structure and presentation (Block 2), the application obtained an average CVI of 0.90, showing that the level of satisfaction of experts with *DoeSangue* was high. However, items 1, 3 and 13 were assessed with CVI slightly below satisfactory (0.75), as shown in Table 2. These items refer to the effectiveness of information contained in the application in relation to target audience, its alignment with the social segment and even if the source's formatting is favorable. It is noteworthy that the score attributed to these items is in line with items 1 and 2, in block 1 (objectives), demonstrating consistency in the assessment.

Thus, it is possible to extract from experts' reports a concern with the quality of information that is made available by *DoeSangue*, so that it does not discourage donors from going to a blood center and, at the same time, can involve them in the blood donation scenario as a practice

inherent to the exercise of citizenship and social responsibility, as E1 points out.

*... I suggest that content be built on the vision of altruism and not on the vision of those who can and who cannot donate. First, because who can and who can't change a lot, this will require revisions, because every life that the Ministry Ordinance changes, then the application will be out of date for a while. (E1)*

Experts pointed out that the application's content follows a logical sequence, is attractive and stimulating - items 4 and 5 (Table 2), in addition to considering the icons, screens and letters used in the tool totally adequate - items 10, 11 and 14, with CVI 1.0. Item 15 refers to the amount of information contained in the application, also assessed with maximum CVI (1.0), as opposed to item 2 in block 1 and some statements by FG, which deal with the same aspect. This shows a certain inconsistency of assessment, which will need a new assessment after adjustments that will be implemented as a result of this study.

SI<sup>8</sup> favors an understanding of the dialectic of meanings, in which discrepancies can assume a symbolic representation of a collective will. Casa-grande<sup>24</sup> states that "this is the normative dimension of a social community, which is structured

in the form of a horizon and which guides the attitudes of different individuals". This occurs in such a way that a desire to adapt the tool to the blood center's needs may have influenced *DoeSangue* assessment.

During a FG with experts, several suggestions emerged and some doubts were clarified about the application's functionality and technological potential. With regard to doubts, functions such as scheduling a donation, recording a statement, generating social mobilization campaigns, generating news, inviting donors and friends of donors to attend the blood center, depend on the application's integration with the blood database center; however, some participants did not understand.

... *I made a wrong appointment, but I did it on purpose. I scheduled a plaque donation to the IJF and the application did; this date is invalid, for example, donate plaque on Sunday at IJF I can't...*" (E4).

With regard to doubts and suggestions, Minayo et al.<sup>15</sup> state that this format of group data collection can accommodate a complementary function to the study, since it aggregates research tools such as brainstorming, raising questions not previously mentioned and expectations previously hidden or not felt. The perceived desires and inferences gathered during FG consolidate the iterative thinking of Participatory Design<sup>7</sup>,

suggesting a continuous improvement to be implemented during the execution of the technological development cycle.

#### **Relevance of the application: what experts say**

Experts were unanimous in affirming the importance of *DoeSangue* for blood donation. Block 3 achieved the highest average CVI (0.95), being supported by statements such as:

... *an application like this is revolutionary in the face of gathering donors (E4).*

Aldamiz-Echevarria and Aguirre-Garcia<sup>25</sup> stress the importance of a blood center adopting marketing resources to attract new blood donors and promote loyalty actions. Therefore, it emphasizes using social networks and digital technologies to establish proximity and relationship with donors. *DoeSangue* is structured to be connected to both the blood center database and users' social networks, offering the possibility of publicizing blood donation campaigns and inviting friends to embrace the cause, through gamification resources.

Kotler et al.<sup>26</sup> state that identifying the target audience's real needs, in order to solve problems, is the biggest challenge for a business. Recognizing the potential of this tool signals that the general objective of this work to design an mHealth

**Table 2.** CVI regarding *DoeSangue*'s structure and presentation.

Structure and Presentation	CVI
1. The app is suitable for guiding the target audience regarding blood and platelet donation.	0.75
2. The information presented is scientifically correct.	0.88
3. Content is appropriate to the target audience's sociocultural level.	0.75
4. There is a logical sequence of the proposed content.	1.0
5. Content is attractive and stimulating.	1.0
6. Language is clear and objective.	0.88
7. Information for donor collection is sufficient and adequate.	0.88
8. Illustrations (images) are relevant to content.	0.88
9. Illustrations (images) are clear and easy to understand.	0.88
10. Screens are well structured and easy to navigate.	1.0
11. Icons are appropriate and help users understand and use the application.	1.0
12. Colors applied to text are appropriate and make it easier to read content.	0.88
13. The size of letters of titles, subtitles, and text are appropriate.	0.75
14. The font used makes it easy to read.	1.0
15. The amount of information contained in the application is adequate.	1.0
CVI average	0.90

Source: Own authorship (2017).



technology to increase gathering and loyalty of blood donors, supporting health promotion, has been achieved.

*... in a way this will really revolutionize the work of attracting donors ... I was so excited about the situation ... some loyal donors know me, they have my contact, they have my email; in informal conversations, you ask "what do you think if you had access to blood center information more easily?" They say "oh, it would be great!" And they start to really talk about this need. So, this is what I found revolutionary. Congratulations, very good! It will provide a powerful reinforcement in donor attraction, both for donors and for people who cannot donate, but would like... (E4)*

Considering the results verified in Table 3, professionals demonstrate that *DoeSangue* offers new strategies that can boost blood donation and favor blood stock maintenance at ideal levels, contributing, also, with improvements in the blood cycle work processes, optimizing costs and avoiding waste, as E6 reinforces: *"I think it is very valuable for them [donors] to know that at that moment they can donate and that they are fit ... it will help a lot!" (E6)*

Furthermore, it is worth mentioning that it is more profitable to invest in the loyalty of real donors than to concentrate efforts in attracting potential donors<sup>27</sup>. Loyalty actions generate less cost than attraction actions, considering that these are directed to a large mass or social segments that may or may not have an intention to donate blood and that demands high advertising investment. In turn, it is assumed that a real donor already understands the donation process and is more inclined to repeat the action.

The overall value of *DoeSangue's* CVI, accounting for three blocks of analysis, was 0.91, considered as a high level of agreement by ex-

perts, proving to be valid in terms of content, structure, functionality and objective. This metric highlights an analysis of certain points of the tool and its items, thus facilitating *DoeSangue* understanding and assessment<sup>28</sup>.

It should be noted that the statements (screen 8), news (screen 9) and messages (screen 10) interfaces present in Figure 1 were not tested because their functionality depends directly on implementing the system's administrative module, which will only be implemented after integrating *DoeSangue* with the blood center database.

### Final considerations

With regard to the purpose and relevance of *DoeSangue*, experts affirmed the significant contribution it can make to the cause of blood donation, which goes beyond the walls of any blood center and has collective meaning, bringing knowledge and guidance to the population with a view to promoting health as a resource for life.

With regard to data collection and interpretation, it was possible to verify the positive results regarding the application's functionality and presentation; in general, they showed a good acceptance from participants, who showed real interest in the tool, generating social meaning. Manifestations of some experts in expanding *DoeSangue's* functionalities refer to the potential perceived from using technology. Evaluators recognize the modern resources of *DoeSangue* (bonuses and integration with blood center database), which can contribute to a culture change favorable to the practice of blood donation, building a more generalized 'more aware and involved with the cause. The possibility of customizing *DoeSangue* with the blood center's language can generate

**Table 3.** CVI regarding *DoeSangue's* relevance.

Relevance	CVI
1. The application stimulates blood donation.	1
2. The material addresses the necessary issues, within the context of blood donation, for who IS NOT a donor	0.75
3. The material addresses the necessary issues, within the context of blood donation, for who IS a donor	1
4. The material is suitable to assist users in the blood donation process.	1
5. The app is relevant to health promotion.	1
CVI average	0.95

Source: Own authorship (2017).

adherence from other blood centers in the country, which, from experts' perspectives, would be a great contribution to causes related to gathering and loyalty of blood donors.

Adopting the qualitative research method, such as FG and CVI, supported by theories such as Participatory ID and SI, for data analysis and interpretation brings greater depth and knowledge about the new social relations driven by advancement of digital media.

It is believed that this study contributes to the dynamics of public health, based on the concept

of equity, inherent to the principles of public health promotion. Furthermore, blood centers in all nations are moving towards the adoption of 100% voluntary blood donation, driven by solidarity and altruistic concepts. Therefore, it is understood that to achieve this opportunity it is necessary to invest in new, effective and pervasive technologies that modify users' behaviors for usual blood donation in sincere commitment to blood stock maintenance in their city, state and country.

### **Collaborations**

JR Silva, CCP Brasil, JE Vasconcelos Filho, BP Brasil, LB Paiva, VF Oliveira and FWR Santos participated in all stages of the study, going through planning, literature review, data collection and analysis, article writing and critical review of the material.

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