A FRAMEWORK FOR DONATING VIA MOBILE DEVICES

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A framework for donating via mobile devices

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ABSTRACT

Over a thousand fundraising non-profit organizations operate in The Netherlands and over 23% of their income is from donations. Mobile donations can have significant impact on these organizations, but there is a lack of understanding regarding implementing donation functionality in mobile applications. In this thesis, I discuss models of philanthropic behaviour, examples of mobile electronic funds transfer methods and guidelines for user experience to gain insight in philanthropy via mobile devices. A framework for donating via mobile devices is proposed and its purpose is demonstrated with the revision of an existing iOS application containing donation functionality. To evaluate the difference between the original and revised version of that application, a between-subject, double-blind, randomized controlled study has been performed. Analysis showed 12.7% of participants preferring an electronic funds transfer method available only in the experimental (i.e. revised) version of the application. The perceived security of the application and scores on the Systems Usability Scale did not differ between control and experimental group. Participants in the experimental group had a higher intention to make a donation compared to control. This framework supports developers in successfully implementing donation functionality without adverse effects on the user experience.

Categories and Subject Descriptors

H.5.2 [**Information interfaces and presentation**]: User interfaces—*User-centered design*; J.4 [**Social and behavioral sciences**]: Sociology—*Philanthropy*

General Terms

Design, Experimentation, Theory

Keywords

Donating, Guidelines, Mobile systems, Philanthropy

1. INTRODUCTION

In The Netherlands, 1464 fundraising organizations are registered at the Central Bureau on Fundraising [1]. According to research performed by the Union Fundraising Organizations, over the year 2011, 36% of these organizations' income came from subsidies and 41% was accounted for by self-raised funds [2]. Donations accounted for 57% of those self-raised funds. With over 23% (57% of 41% in total) of their income coming from donations, improvement in the area of donations would have relatively high impact on these organizations.

Nowadays, more than half of the Dutch population has a smartphone and over 30% has a tablet. Furthermore, the popularity of online shopping has also been increasing for the last ten years – as illustrated in Figure 1. These factors, combined with the current availability of mobile payment and mobile banking applications, shape new possibilities for donating via mobile devices.
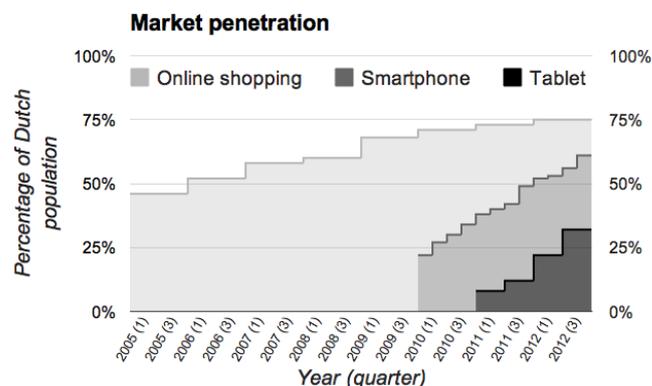

Figure 1: Percentage of Dutch people between the ages of 12 and 74 that do online shopping (data from [3]); Smartphone and tablet penetration in Dutch population (data from [4]).

Several applications on mobile devices implement donation functionalities. The game "Raise The Village" lets players farm on digital land. Players are able to buy digital game-enhancing goods to help their farming. This also directly supports people in an actual African village [5]. A more functionally oriented application, such as the Terre Des Hommes application, mainly shows the projects they are working on and offers functionality to donate to their foundation directly [6]. UNICEF has several applications that give inform-

ation about the organization and her current projects. Users are also able to see how they can contribute to a current project or how they can donate in general [7]. These applications are the place where philanthropy, mobile electronic funds transfer, and user experience meet in practice. These subjects have each been studied extensively, but there is a lack of understanding regarding implementing donation functionality in mobile applications.

This paper aims to fill this void by studying the following questions:

1. What has previous research on soliciting donations shown?

2. What are the technical possibilities for making donations via mobile devices?

3. How can the technical possibilities be implemented effectively without adverse effects on the user experience?

This research has been performed during an internship at the Utrecht-based company Puurpxl. In summary, the main research question is as follows:

How should Puurpxl design mobile applications to empower users in supporting non-profit organizations via mobile devices?

A literature study was performed on soliciting donations, motivations behind donating, and mobile electronic funds transfer methods. Section 2 discusses two models of motivation behind philanthropic behaviour. Section 3 discusses several methods for mobile electronic funds transfer. Section 4 discusses guidelines for the user experience of iOS and Android applications. These models, methods and guidelines give shape to a framework proposed in Section 5. Then the case of Natuurmonumenten is introduced in Section 6. The proposed framework is applied to the case by revising an iOS application. To evaluate the difference between the original and revised version of the application, a between-subject, double-blind, randomized controlled study is performed. Section 7 discusses findings and suggestions for future work.

2. PHILANTHROPY

To answer the first question posed in Section 1, I now discuss parts of the large body of research concerning philanthropy. The extent of generosity of people [8–12], the type of people that make donations [13–17], and the motivational structures behind donating [18–28] have been subject of much research. The last of these three facets is the major domain focus of this paper. I now discuss two models of motivational structures.

2.1 Mechanisms of donating

Bekkers and Wiepking describe eight mechanisms that influence donating from the perspective of the donor [18]. These mechanisms are ordered roughly chronologically. This is in line with the concept of choosing to help others being a series of consecutive decisions [24, 25]. The mechanisms are described as follows:

Awareness of need is the donor's perception of an organization's or individual's need. The relation between the degree of need for help and likelihood of help being given tends to be positive in both causal directions [29, 30]. In other words, people that need help are likely to be given help and the people that are likely to be given help tend to need it. However, the perceived (contrary to absolute) degree of need shows to be crucial in relation to the likelihood of help being given [31];

Solicitation precedes most donations. All these mechanisms should be taken into consideration when creating a solicitation. For example, a solicitation is more likely to be successful if giving in response to that solicitation is in alignment with altruistic motives of the donor or provides the donor with an increase in reputation;

Costs and benefits are obviously related to giving. The amount given is a direct part of the cost. However, elements such as tax advantages and obstacles in the process of making a donation also affect the cost [32]. Benefits potentiate donations and they can consist of exclusive information, services or gifts – the effect of fringe benefits is even more profound with donation-dependent benefits [33, 34]. For example, donors giving €5 or more receive a set of stickers, but donors giving €15 or more receive a t-shirt in return. In addition, personal gain may play a role: donating to medical research might prove to be advantageous for the donor in the future [35];

Altruism concerns selfless motives aimed to make a change towards a desired state of affairs. For example, donating to those that have a need for it. The weights of these motives decline with increase of perceived social context. This is caused by diffusion of responsibility, known from the 'bystander effect' [23, 36];

Reputation is influenced by making a donation, because donating is generally seen as a socially desirable thing to do [37]. Social context can have a very significant influence on the donations. Not making a donation can even hurt reputation instead of not enhancing it [38]. This social context does not necessarily have to be physical. The mere perception of being among others has a significant positive effect on the donations being made, compared to a socially less engaging situation [10];

Psychological benefits are feelings such as the 'warm glow' or affirmation of the donor's positive self-image [19]. People that are in a good mood respond better to positive rewards such as the 'warm glow'. People in a bad mood tend to avoid punishing consequences, such as the internal conflict of not helping when it is normal to do so [39]. This self-image critique also plays a role in the 'foot-in-the-door' [40] technique and the technique called 'legitimizing paltry contributions' [41]. Furthermore, actively labelling people as 'helpers' increases donations [42];

Values or people's value systems are central to the desire to change the world towards a certain state: these values describe this desired state. For example, such values may focus on animal welfare, social justice or diminishing poverty. An alignment of values between potential donors and organizations enhances donating [43];

Efficacy describes the perception of making a difference by donating. This is related to confidence in the organization and (inversely) the likeliness of the contribution being spent on fundraising and overhead costs [44]. There is a positive relation between this perception of efficacy and donations [45]. For this reason, visually very attractive materials for fundraising are not always the right choice as they might increase the perceived fundraising and overhead costs [46].

2.2 Stages of donating

Nomensa is a British experience design agency. They discuss several factors in their white paper that, from the perspective of the application, influence the donation experience [47]. These factors are categorized into four stages. The stages are ordered chronologically, as with Bekkers and Wiepking's mechanisms.

Unfortunately, the white paper contains no references to scientific literature. As no empiric evidence or scientific embedding is provided, the face value of the white paper is disputable. Only after further investigation of the claimed facts was this white paper used for this research. Therefore, the references to literature that follow are product of literature research by the author.

Nomensa describes the stages Engage, Nudge, Support and Reward as follows:

Engage In the target audience, generally two groups exist: people who might give help and those who might need help. In this early phase, the goals and outcomes of the organization's efforts should be clear for both these groups [48]. For the donations, a sense of urgency should be conveyed [49]. Being clear on how the donation would specifically be put to use is good practice. This provides confidence in the efficacy of the donation [49, 50]. Providing a social context has a potentiating effect on donations [12, 38]. Such context can be created by communicating the behaviour of others. Nomensa also advises letting people put money towards a very specific target, but no reports of studies were found showing empirical evidence in favor of this approach;

Nudge This phase is mainly about reducing the costs of donation in terms of user experience. Proper interface and process design avoids these types of incurred perceived costs [32]. For example, lack of security cues or choice of payment methods might have a detrimental effect on the perception of the donation process [32]. A long-term value proposition can also reduce perceived cost – if a small donation is made regularly, more efficient long-term planning is possible;

Support Ensure that a potential lack of clarity and transparency does not turn into a perceived cost increase for the donor. Proper form design plays a significant role in clarity and transparency. For instance, a clear idea of progress throughout the process increases the process transparency. In addition to these factors, proper labeling and feedback on input from the user guards the positive user experience [32]. Furthermore, to avoid process abandonment, completing the donation should be the main focus during the donation process. This is not very controversial, but Nomensa goes as far as saying the process should be completely isolated from the rest of the experience. No empirical evidence was found in favor of approaches such as removing navigational elements in the donation process. Nomensa's white paper also discusses tax mechanisms specific to the United Kingdom. Suffice to say that if beneficial tax mechanisms exist, communication of these should be taken into consideration as these can influence the donor's perceived cost of the donation;

Reward Nomensa advises giving a reward to donors by enabling them to communicate to their peers and the public about their choice to donate, which is indeed good practice [34]. Giving a definitive confirmation when the transaction is successful also serves the user well [32]. Providing a prominent and personal thank you message to convey your appreciation is simply a polite thing to do. Moreover, this gives opportunity to encourage them to engage further with the charity.

3. ELECTRONIC FUNDS TRANSFER

This section continues towards a framework by discussing several methods for mobile electronic funds transfer. For each method I discuss strengths, weaknesses, opportunities and threats. These methods are selected based on the preferences of the Dutch public.

A report by Currence, the Dutch organization governing the uniform payment methods in The Netherlands, shows that 59% of transactions from online shopping were made through iDEAL, 6% through PayPal, and 5% using a credit card [51]. Other viable options for donating via mobile devices each accounted for less than 5% of total transactions in 2012. These are therefore not discussed. One-off direct debit (known to the Dutch as 'Incasso' or 'Machtiging') is also not discussed here. Though popular for online shopping, these legally require a signed paper mandate making it unsuitable for mobile electronic funds transfer [52]. In addition to these methods, I discuss the existing payment mechanisms embedded in Android and iOS.

3.1 iDEAL

Dutch iDEAL is an initiative by several Dutch banks, introduced in 2005 [53]. It is governed by Currence, as are PIN, ChipKnip and other uniform funds transfer methods in The Netherlands. iDEAL allows customers to make online purchases using direct online transfers from their bank account. The customer selects their bank at check-out and provides authorization credentials to log in. Main strength of iDEAL is the widespread availability. The yearly amount of transactions through iDEAL has been growing steadily over the last six years. Of online merchants, 93% support iDEAL. In addition, part of the iDEAL check-out process visibly takes place in the user's bank website which instills an important sense of trust and security [54]. A weakness in the iDEAL method is the fact that in most cases the user needs a bankcard and small seperate device to authorize the transaction. Opportunity lies in a specialized mobile version of the system. A version preferably not needing the external device or bankcard. At this time, ING and Knab are the only banks supporting a mobile version of iDEAL [55, 56]. Threat lies in the fact iDEAL only lets users pay in advance. Should

paying after delivery gain popularity, iDEAL has no mechanisms to support this.

3.2 PayPal

PayPal is an American company, owned by eBay, that lets account holders perform funds transfers and connect their bank account to their PayPal account [57]. Main strengths of PayPal are its relatively easy mobile implementation and simple checkout process with just a username and password. PayPal's weakness is its small user base compared to iDEAL in The Netherlands. Herein lies an opportunity to gather a larger user base through higher mobile adoption. However, competitors' initiatives threaten PayPal's capture of the Dutch market.

3.3 Credit card

Strength of the credit card is its long heritage. Plenty of implementations are available. Its weakness lies in the transaction costs and the amount of information needed before being able to fulfill a transaction. Opportunity lies in being able to perform online credit card transaction with simpler authorization. Though many people own a credit card, threat lies in the credit card business losing ground to cheaper alternatives.

3.4 Premium SMS

Premium SMS messages are reverse-billed. The user sends an sms to request a premium SMS and is billed as the recipient of that SMS. The ubiquity of SMS technology and brevity of the process show strength of this simple mechanism. Dutch premium SMS law has been improved due to subscription scams that gave the technology a shady image. These new laws aim to enhance the customer friendliness and transparancy of this technology. Also, the donation amount is not variable. Rigid donation amounts need not be prohibitive for the implementation in donation settings, however these restrictions need to be taken into account. Premium SMS has an opportunity to reposition itself as a safe, quick and transparent way of transferring funds. Other more flexible alternatives are getting quicker and easier still. This creates a threat to the relevance of premium SMS services.

3.5 In-app purchases

Transactions can also be made inside Android and iOS applications. The fact that these funds transfer methods are already embedded is a key strength. A weakness of this approach is the possible confusion of the beneficiary of the donation. Users might get the impression that the donation goes to the developers of the app, instead of the publishing organization. On Android, implementing such in-app purchases as part of donation functionality still is a viable option. Payments made from inside Android apps are handled through Google Wallet [58]. Google Wallet mainly connects to credit and debet cards. In-app purchases on iOS are debited from the user's iTunes Store credit [59]. For iOS, in-app purchases are not an opportunity as a funds transfer method. Apple has a strict policy for admitting apps to their App Store. An application with donation functionality has to be free and the actual donation has to take place outside the application: in the Safari browser or via SMS [60].

This rule is not just a threat, it eliminates the possibility of in-app purchases as donations on iOS.

4. USER EXPERIENCE

Having discussed the philanthropy and electronic funds transfer domains, I now discuss the third – and final – domain of the framework: user experience for mobile devices.

Google's Android and Apple's iOS dominate The Netherlands with respective market shares slightly over 50% and 44%. Both Android and Apple provide categorized guidelines for the design of mobile applications. Violations of these guidelines have detrimental effect on the user experience. These guidelines were created with their own specific Operating System in mind, but an integration of these two proved them to be not so different [61]:

Feedback The application instantly provides feedback to user input, also letting the user know when input is being processed and the results can not be shown just yet.

Interruptability The application is always ready to continue from where the user left off earlier, or to cancel an operation in progress.

Consistency The application uses familiar patterns of user interface elements and gestures, and elements that look similar also function similarly.

Assurance Destructive actions always need confirmation, non-destructive actions are guided by easily editable suggestions, directly where the user gives input.

Clear metaphors The application uses clear metaphors to clarify ideas and functions, for example, in icons and interactive objects.

No unnecessary frills The appearance and function should integrate well, language should be clear and users should be shielded from unimportant details.

Clear assistance If an error occurs, clear recovery instructions should be given without too much technical detail.

Colour and contrast The application employs not just colour, but also luminance contrasts or shapes to discern different visual elements.

5. FRAMEWORK FOR DONATING VIA MOBILE DEVICES

The answers to the first three questions posed in Section 1 that have been formulated in the three preceding sections, are brought together to form a framework. This section briefly describes the three elements of the proposed framework as illustrated in Figure 2. These are applied to the Natuurmonumenten case later on in Section 6.

5.1 Possibility

As discussed in Section 3, different contexts, targets, and organizations require different approaches in funds transfer. Proper implementation of funds transfer methods invokes a sense of familiarity and security, as discussed in the second stage in Section 2.2. This creates the possibility for the user to make a donation.

5.2 Intention

Though given possibility, a user will not make a donation if he or she does not intend to do so. Several factors play a role in the solicitation. These factors are awareness of need, costs and benefits, altruism, reputation, psychological benefits, values and efficacy as discussed in Section 2.1 and the stages Engage and Nudge as discussed in Section 2.2.

5.3 Ease

By keeping the UX guidelines from Section 4 and the last two stages from Section 2.2 in mind, the user experience of the application is safeguarded. This keeps perceived costs low.
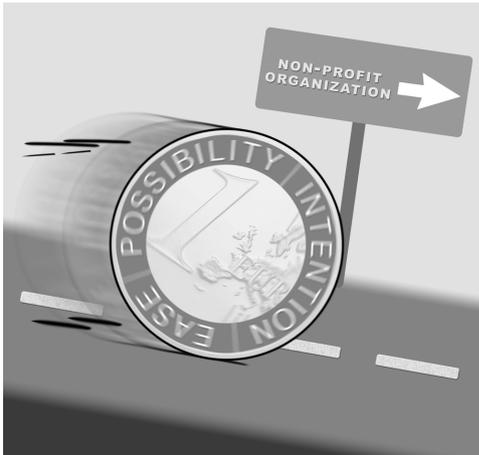

Figure 2: An illustration of the framework, the trichotomy of factors that influence donating via mobile devices.

6. CASE: NATUURMONUMENTEN

In this section a case is used to demonstrate an application of the proposed framework and perform an experiment to test its effect. This section first introduces the Dutch organization Natuurmonumenten and discusses the general function of their application. I state hypotheses on the effect of applying the proposed framework to this case. The methods used to test the hypotheses are discussed, and finally, I discuss the results from the performed tests.

6.1 The application

The Dutch non-profit organization Natuurmonumenten aims to conserve and manage important Dutch terrains. This includes the monumental objects located on these terrains [62]. Their application 'Natuur Routes' lets users browse and use GPS guided hiking tours through nature. The route data is enriched with textual and auditory comments about the surroundings [62]. After each completed route, if and only if a star-rating is given by the user, a donation solicitation is presented. The application is available for Android and iOS [63, 64]. In this research, for the sake of simplicity, the focus is on the iOS version of 'Natuur Routes'.

6.2 Hypotheses

It is expected that applying the principles of the proposed framework results in better *possibility* to donate, favourably influences the user's *intention* to donate, and avoids interruption of the user experience by not compromising on *ease*. This leads to the following hypotheses:

H_1 Applying the principles of the proposed framework will favourably influence the user's intention to donate.

H_{2a} Applying the principles of the proposed framework will favourably influence the availability of user-preferred electronic funds transfer methods.

H_{2b} Applying the principles of the proposed framework will not adversely influence the perceived security of the application.

H_3 Applying the principles of the proposed framework will not adversely influence the user experience.

6.3 Method

In this section, I discuss the participants of the experiment, the materials and measures used, the design of the experiment, and the procedure followed in the experiment.

6.3.1 Participants

Dutch participants were gathered by opportunity sampling. Via Facebook[1] and e-mail approximately 720 individuals were given the URL to the experiment website and solicited to participate. The link was disseminated on Facebook via status updates of the author and in Facebook groups. These groups were those for the Master of Information Studies of the University of Amsterdam; for the Amsterdam study association for informatics, information studies and artificial intelligence ("VIA") and for the Utrecht study association for informatics and information studies ("Sticky"). The website was open for participants for 17 days. A total of 104 people participated in the experiment. Both the control and the experimental group contained 52 participants. In both groups one participant indicated having prior experience with the application. Their contributions were not taken into further account because of potential bias by learning effects.

The participants showed to be fairly active in terms of online purchases and transactions. In the last six months, most participants had regularly done online purchases or transactions (see Q6 in Table 1). Most people regularly used online banking (Q7), but less so on mobile phones (Q8). Almost all of the partipants were familiar with iDEAL (Q9) and used it regularly (Q10). Slightly fewer participants were familiar with PayPal (Q11) and relatively few used it regularly (Q12). Participants agreed more to preferring to use iDEAL for making donations (Q13), compared to preferring PayPal (Q14). Three participants in the control group and four participants in the experimental group indicated already being a supporter of Natuurmonumenten.

6.3.2 Materials and measures

Two interactive online prototypes of the iOS application were created with Axure[2]. These interactive prototypes were hosted on a website owned by the author. The site

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[1] http://www.facebook.com

[2] http://www.axure.com

Survey question	Strongly disagree -1-	-2-	-3-	-4-	-5-	-6-	Strongly agree -7-
Q6: I have regularly made purchases or transactions online in the past six months	3.9%	7.8%	2.0%	4.9%	7.8%	22.5%	51.0%
Q7: I regularly use online banking	1.0%	1.0%	–	1.0%	2%	15.7%	79.4%
Q8: I regularly use online banking on my mobile phone	34.3%	7.8%	–	2.9%	5.9%	12.7%	36.6%
Q9: I am familiar with iDEAL	1.0%	–	–	–	–	4.9%	94.1%
Q10: I regularly use iDEAL	1.0%	–	–	2.9%	4.9%	13.7%	77.5%
Q11: I am familiar with PayPal	7.8%	4.9%	7.8%	3.9%	8.8%	16.7%	50.0%
Q12: I regularly use PayPal	33.3%	15.7%	6.9%	5.9%	8.8%	10.8%	18.6%
Q13: If I was to make a donation, I would prefer using iDEAL	2.9%	2.9%	2.9%	9.8%	3.9%	17.6%	59.8%
Q14: If I was to make a donation, I would prefer using PayPal	41.2%	14.7%	11.8%	13.7%	5.9%	6.9%	5.9%

Table 1: Online financial behaviour, frequencies in percentages. Values of 0.0% were replaced with "–".

was created solely for the purpose of this experiment. Participant opinion and experience was surveyed using the Google Forms[3] tool.

One of the two prototypes served as a control version. This version was modelled after the application as it is currently available. The other prototype was constructed by applying several principles of the proposed framework to the control version. I will now describe some of the issues found in the control versions, and the according changes that were made. A complete list of the issues found in the control version, with their related factors from the proposed framework, can be seen in Appendix A.

Security cues in the control version, such as an iDEAL logo, were only visible in the actual donation process (issue #2 in Appendix A). These cues do not optimally exercise their ability to instill trust if implemented late in the user experience. In the experimental version, these cues were also visible before the actual donation process. These can be seen on the right-hand side of the green button in Figure 3. Also, these cues show an added electronic funds transfer method. Only iDEAL was available in the control version (issue #3). PayPal was added, as this is the second most popular electronic funds transfer method in The Netherlands. Furthermore, the solicitation in the control version contained very little social context (issue #8). The experimental version contained a picture of a woman. She was described as a volunteer for Natuurmonumenten, which also stresses the fact that Natuurmonumenten is a non-profit organizaton (issue #4).

To measure the effects of these and other differences between the control and experimental versions, survey questions were formulated. These were based on the models discussed in Sections 2, 3 and 4. Together, they reflect the three factors of the proposed framework (*possibility, intention, ease*). For sake of brevity, I will not discuss the entire set of questions here – these can be seen in Appendix B.

The main criterium for *possibility* was the availability of the preferred electronic funds transfer method of the user (Q13, Q14). In addition, sense of security was measured
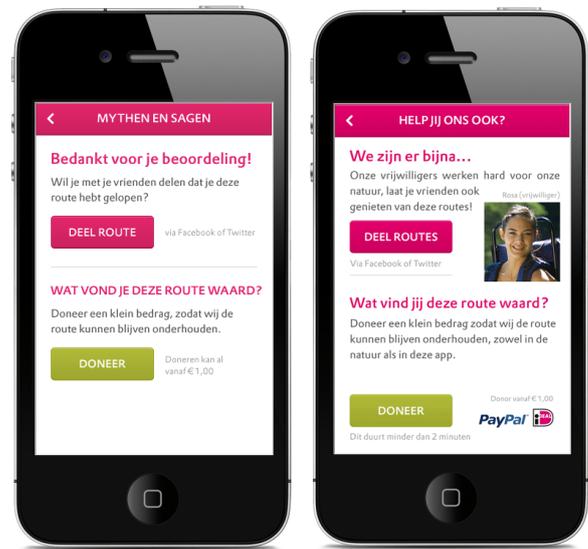
Figure 3: Control version (l) and experimental version (r). Corrected donation solicitation based on issues #2, #3, #4 and #8 from Appendix A.

with questions taken from Salisbury et al. (Q2-Q5) [54]; Cronbach's $\alpha = .946$. *Intention* was reflected by the self-reported inclination to make a donation (Q1). For *ease*, the System Usability Scale was implemented (Q15-Q24) [65]; Cronbach's $\alpha = .850$. Several other factors were also surveyed. Among these were questions about online financial behavior (Q6-Q14), about already being a supporter of Natuurmonumenten (Q25) and about prior experience with the 'Natuur Routes' application (Q26).

6.3.3 Experiment design

The experiment was a between-subject, double-blind, randomized, controlled study. All measures were on 7-point Likert scales anchored by polarized agreement, with the exception of the System Usability Scale which is on a 5-point Likert scale. Systems Usability Scale items were recoded as prescribed to generate the score [65].

6.3.4 Procedure

The main page of the experiment website informed visitors about the experiment. Visitors were advised that the research is aimed at the Dutch public. Visitors on mobile devices were advised to use a desktop or laptop, and they were given the opportunity to be reminded via e-mail to participate at some other time. Visitors were informed on the global aim of the research, the procedure of the experiment and the handling of the recorded data. Participants were not compensated for their efforts. Eight movie tickets (individual value of € 7,50) were raffled off among the participants that left their e-mailadress in the survey. Names and contact information of the researcher and guiding staff were provided. A link at the bottom of the page linked to the actual experiment. A simple PHP script randomly assigned the participant to either the control or the experimental group.

The experiment consisted of a webpage split vertically into two frames. The survey on the left-hand side, the interactive application simulated inside the image of a black Apple iPhone 4 on the right-hand side (see Figure 4). For the control group, the right frame contained the control version of the application. For the experimental group, the right frame contained the experimental version of the application.

Scenario and tasks were presented for the participant to use the application. When the application solicited the participant to make a donation, but before the user was instructed to do so, the participant was asked to report if they expected themselves to make a donation in the scenario. More details on the contents of the survey are available in Appendix B.
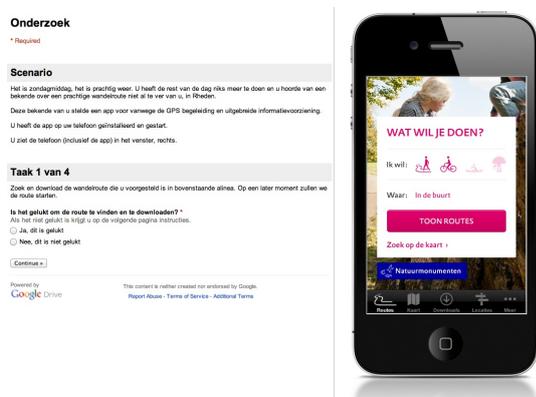

Figure 4: Experiment webpage at window width of 1100 pixels and height of 800 pixels.

6.4 Results

I will now discuss the results, relating directly to the hypotheses. All results are at a significance level of $\alpha = 0.05$ unless otherwise stated.

6.4.1 Hypothesis testing

H_1 Self-reported inclination to donate in the scenario, before the actual donation process, was higher in the experimental group ($M = 3.37$, $SD = 1.549$, $N = 51$) compared to control ($M = 2.69$, $SD = 1.568$, $N = 51$); $t(100) =$ $-2.22, p < .028$. This result leads me to reject the t-test null hypothesis, and to accept H_1.

H_{2a} Out of all the participants combined[4], 12.7% indicated having a higher preference for PayPal ($M = 2.73$, $SD = 1.920$), which was only available in the experimental version. This was in comparison to iDEAL ($M = 6.01$, $SD = 1.589$), which was available in both the control and experimental version. In other words, the control version would not offer the preferred mobile electronic funds transfer method for 12.7% of the participants, whereas the experimental version would. This shows a better availability of preferred electronic funds transfer methods in the experimental version and H_{2a} is accepted.

H_{2b} No evidence for difference on perceived security between the control ($M = 4.81$, $SD = 1.546$) and experimental group ($M = 4.82$, $SD = 1.420$) was found. Not accepting absence of evidence for difference as evidence for absence of difference, I employ a TOST test for equivalence under the null hypothesis of a significant difference between the groups ($\theta = 1$ scale point); $CI = [-0.498, 0.478]$. This result leads me to reject the TOST null hypthesis, and to accept H_{2b}.

H_3 Scores on the System Usability Scale did not show to be different between the control ($M = 65.34$, $SD = 6.021$, $N = 51$) and experimental group ($M = 67.01$, $SD = 6.265$, $N = 51$); $t(100) = -1.370, p < .174$. The margin for TOST equivalence testing is defined as the standard deviation of the control group. This standard deviation is less than that of the experimental group ($\theta = SD_c = 6.021$); $CI = [-3.687, 0.353]$. This result leads me to reject the TOST null hypothesis, and to accept H_3.

7. DISCUSSION AND CONCLUSION

In this research I investigated how donating via mobile devices should be implemented. In this case, more specifically, how the company Puurpxl should design mobile applications to empower users in supporting non-profit organizations via mobile devices. This was broken down into the three following questions. What has previous research on soliciting donations shown? What are the technical possibilities for making donations via mobile devices? How can the technical possibilities be implemented effectively without adverse effects on the user experience?

Studying previous research on soliciting donations, I found two models representing the motivational structures behind donating. The first model describes a series of chronological factors that play a role in the mental process of potential donors [18]. The second model describes, from the perspective of the application, four phases of making a donation [47]. These two models provide a range of factors to consider when creating a donation solicitation. I discussed several technical possibilities for making donations via mobile devices using electronic funds transfer methods. Strengths, weaknesses,

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[4]TOST equivalence testing ($\theta = 1$ scale point) shows evidence for equivalence between the control ($M = 5.84$, $SD = 1.642$) and experimental group ($M = 6.18$, $SD = 1.532$) on reported iDEAL preferences; $CI = [-0.855, 0.189]$. Analagous for the control ($M = 2.90$, $SD = 2.022$) and experimental group ($M = 2.55$, $SD = 1.815$) of PayPal preferences; $CI = [-0.279, 0.985]$ [66].

opportunities and threats have been discussed in terms of mobile implementation of these methods. Furthermore, a set of guidelines was discussed to guard the user experience from adverse effects [61]. These answers to the three questions were brought together to answer the main research question. To aid in designing mobile applications that empower users in supporting non-profit organizations via mobile devices, a framework is proposed with three elements: *possibility, intention* and *ease*. These three elements encompass the discussed factors, methods and guidelines.

The proposed framework was applied in the revision of an existing iOS application with donation functionality [64]. The revised version of the application differed from the original in several ways. For example, security cues were implemented earlier in the user experience. This was done to instill an important sense of trust [54]. These cues consisted of logos of electronic funds transfer methods. The revised application had PayPal as an added electronic funds transfer method, which 12.7% of participants later preferred to iDEAL. Furthermore, the social context of the donation solicitation was enhanced by including a picture of a woman and describing her as one of Natuurmonumenten's volunteers [10]. Additionally, this reference to volunteers supported the communication of the non-profit nature of the organization. Being aware of that non-profit nature is important for the awareness of the need of the organization [31].

To investigate the difference between the original and the revised application, a between-subject, double-blind, randomized, controlled study was performed. The original application was implemented as the control. Results from the study showed that, in concurrence with the hypotheses, self-reported inclination to donate was higher in the experimental group. Also, the availability of the user-preferred electronic funds transfer method was better in the experimental group. The scores on the Systems Usability Scale and perceived security showed to be equivalent between control and experimental group. This indicates an overall beneficial effect of utilizing the proposed framework during the revision of an application. The fact that scores on the Systems Usability Scale and on perceived security did not differ between control and experimental group may be explained by either of the following. Either the changes that would reflect on the usability and perceived security would not be uncovered with such a prototypical implementation, or the changes were simply not warranted. Further development of this, and potentially more, experimental applications would be necessary to clarify this.

One of the limitations of this research is that, due to the narrow scope of the demographic data, I cannot exclude a potential influence of factors such as gender, age or education. Furthermore, this is only one case with a subset of the possible outcomes of the framework implemented. For example, donation-dependent benefits were not implemented in this case because there was not enough room on the screen to accommodate this.

Future work should address, besides the limitations mentioned, refining this framework by investigating inter-item weights and relations via Factor Analysis. This could give insight in how to prioritize items in case of conflict or scarce resources. Also, cost factors could be taken into account when choosing electronic funds transfer methods, instead of only the expected preference of the users.

There was a lack of understanding regarding implementing donation functionality in mobile applications. The framework proved to be useful in the revision of an existing iOS application with donation functionality, where it facilitated a growth in inclination to donate. The fact that application development is often an iterative process suggests that the proposed framework could also be of value during development of other applications. The proposed framework provides a structured integration of domain knowledge from philanthropy, mobile electronic funds transfer and user experience. This ensures that when applications are developed to support non-profit organizations, the users are given every possibility to act on their intentions with ease.

Acknowledgements

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APPENDIX
A. CHANGELOG 'NATUUR ROUTES'

Issue #	Framework category	Literature category	Description	Situation after correction
1	Possibility	Solicitation	The user is only solicited for a donation after having finished a route and having assigned a star-value. There are three ways the user might abandon this flow (back button, x-button or tap outside star-value form).	Donation solicitation is shown even if star-value form is exited without giving a star-value.
2	Possibility	Nudge	Security cues are presented when the user is already in the donation process.	Security cues are presented during donation solicitation.
3	Possibility	EFT	There is only one EFT method available.	In addition, PayPal is available.

Table 2: Changelog of the Natuurmonumenten application – changes relating to *possibility*.

Issue #	Framework category	Literature category	Description	Situation after correction
4	Intention	Awareness of need	The fact that the organization is an NPO and that volunteers/donations are important for the organization is only mentioned in a tucked-away menu and nowhere found during typical usage.	The value of the volunteers is stressed in the donation solicitation. The organization is identified as a recognized NPO.
5	Intention	Costs and benefits	There is no mention of possible tax advantages.	These are mentioned in the 'Meer' tab.
6	Intention	Costs and benefits	A concrete proposition for potential personal gain is given by stating that a donation will help in the maintenance of the application content.	No correction necessary.
7	Intention	Altruism	In the donation solicitation, there is a direct reference to the user ("you"). This reduces social context, thereby avoiding a decreased weight of any altruistic motives through the 'bystander effect'.	No correction necessary.
8	Intention	Reputation	Besides the amount of people that voted on a route, there are barely any social cues.	Social context is enhanced in donation solicitation.
9	Intention	Psychological benefits	Asking for the perceived value of the route creates opportunity to donate, and affirm a positive self-image of being just.	No correction necessary.
10	Intention	Values	The values of the organization are not clear from the application.	The values are made clear in the solicitation.
11	Intention	Efficacy	The application does not adequately make clear how donations are put to use.	Purpose of donations clarified in solicitation.
12	Intention	Engage	The goals and outcomes of the organization are not communicated.	The goals and outcomes become clearer from the solicitation. There is no room for full elaboration.
13	Intention	Engage	The solicitation does not convey a sense of urgency.	This was not implemented as a sense of urgency would detract from the relaxed user experience of walking in Nature.
14	Intention	Engage	The application does not convey behaviour of others as social proof.	This was not implemented due to a lack of space.
15	Intention	Nudge	Regular giving is not mentioned at all.	Not implemented due to lack of legal electronic mechanism for repeating direct debits.

Table 3: Changelog of the Natuurmonumenten application – changes relating to *intention*.

Issue #	Framework category	Literature category	Description	Situation after correction
16	Ease	Support	The amount of time necessary for making a donation is not clear in advance.	The typical duration of the donation process is mentioned in advance.
17	Ease	Support	Input field 'date of birth' is sensitive to formatting [dd/mm/yyyy], and this formatting is not disclosed.	This field is no longer part of the form.
18	Ease	Reward	After donating, the user is given very little sign of gratitude and is redirected back to the donation page.	The donor is thanked more sincerely and redirected to the homepage of the organization afterwards.
19	Ease	Feedback	Very little visual feedback is given when tapping the blue circles on the map.	The blue circles give clear visual feedback when tapped.
20	Ease	Interruptability	It is not possible to cancel the download of a route.	It is possible to cancel a download in progress.
21	Ease	Interruptability	During a route, the application may be shut down without loss of progress in the application.	No correction necessary.
22	Ease	Consistency	Buttons and labels are styled consistently.	No correction necessary.
23	Ease	Assurance	When deleting a route, confirmation needs to be given.	No correction necessary.
24	Ease	Assurance	When typing a location to find a route, suggestions appear beneath the text box instantly.	No correction necessary.
25	Ease	Clear metaphors	All metaphors appear clear.	No correction necessary.
26	Ease	No unnecessary frills	The appearance of the application integrates well with its function.	No correction necessary.
27	Ease	No unnecessary frills	There is an unnecessary high amount of obligatory input fields when making a donation through iDEAL.	Amount of input fields is half of the original amount.
28	Ease	Clear assistance	If no routes are found based on search, this is not communicated except with an empty list.	A search without results is acknowledged explicitly.
29	Ease	Clear assistance	If no routes are downloaded yet, this is not communicated except with an empty list.	An empty download list is acknowledged explicitly.
30	Ease	Colour and contrast	Sufficient luminance contrast is used to avoid problems for users that have colour perception issues.	No correction necessary.
31	Ease	Colour and contrast	The download button changes to a progress bar, but this overlaps the text in it. During the process, it might not be clear what the application is doing.	The text shows through the progress bar.

Table 4: Changelog of the Natuurmonumenten application – changes relating to *ease*.

B. SURVEY

The survey was in Dutch, these are translations by the author. The following questions were posed in the survey:

Please indicate to what extent you agree with the following statement:

Q1 I would feel inclined to make a donation is this scenario

Q2 I would feel secure making a donation with this application

Q3 This application is a secure means through which to make a donation

Q4 I would feel totally safe making a donation with this application

Q5 Overall, this application is a safe place to make a donation

Q6 I have regularly made purchases or transactions online in the past six months

Q7 I regularly use online banking

Q8 I regularly use online banking on my mobile phone

Q9 I am familiar with iDEAL

Q10 I regularly use iDEAL

Q11 I am familiar with PayPal

Q12 I regularly use PayPal

Q13 If I was to make a donation, I would prefer using iDEAL

Q14 If I was to make a donation, I would prefer using PayPal

Q15 I think that I would like to use this application frequently

Q16 I found the application unnecessarily complex

Q17 I thought the application was easy to use

Q18 I think that I would need the support of a technical person to be able to use this application

Q19 I found the various functions of the application well integrated

Q20 I thought there was too much inconsistency in this application

Q21 I would image that most people would learn to use this application very quickly

Q22 I found the application very cumbersome to use

Q23 I felt very confident using the application

Q24 I needed to learn a lot of things before I could get going with this application

Q25 Are you a member/current supporter of Natuurmonumenten? [YES / NO]

Q26 Had you ever used this application before? [YES / NO]