ANDROID PHONE PERSONALIZATION AND USE

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Abstract— A smartphone can be personalized either by modifying its appearance or by adapting its functionality/content to the user's needs. We looked at the personalization habits and self-reported usage in a group of students furnished with an Android smartphone. Appearance personalization was done mainly by changing the wallpaper. Functionality personalization was done by downloading apps, putting them on the home screens, changing the launcher and, in some cases, modifying the favorites tray. Although entertainment apps were downloaded most often and tool and entertainment apps were most often placed in the home screens for quick access, participants reported using their smartphones primarily for socialization and search. Participants appreciated the smartphone mainly for how it supported their social needs. At the same time, they were worried about it alienating them from the people around them. In summary, personalization supported Android users' relatedness, utilitarian, and hedonic needs.

Author Keywords— Smart phones; Android; Personalization; Appropriation..

INTRODUCTION

TECHNOLOGY personalization is the process of modifying a technological system in order to make it more personally relevant to its users [1], by modifying the system's appearance (e.g., changing colors), its functionality (e.g., changing a software's menu), or its content (e.g., adding songs to a music library). Users' desire to personalize a device depends on several factors: frequency of use, feeling of ownership, system aspects (i.e., simplicity of personalization, efficacy of self-expression or emotion creation, cost, and technical constraints) and usage context (personal or work context, seasonal, media, and peer influences) [2]. Personalization helps people achieve a sense of identity and gives them a sense of control [8]. It can have a variety of impacts: cognitive (e.g., usability, aesthetics, recognition, system familiarity), emotional (e.g., system attachment, personal/group identity, amusement), and control (e.g., feeling of control and of ownership) [9].

Research on personalization in ICT has concentrated mostly on computers, websites and mobile phones [e.g., 2, 7, 8, and 10]. However, few papers have looked at smart phone personalization, yet personalization is one of the factors that can impact technology adoption [e.g., 4].

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SMARTPHONE PERSONALIZATION

Personalizing smart phones is an extremely easy process: their popularity has ensured easy access to external covers and decorations while the app stores have made it simple to download a wide variety of free or cheap apps to adapt their functionality to the user's needs. Nevertheless, there are few papers on smartphone personalization.

People using an apple iphone [11] tended to install games most often: however facebook was the app installed by most people. As well, people tended to put the apps they launched most often on the first screen. Although there were a few gender differences reported by the authors (e.g., women made appearance changes more often than men), those differences did not seem stable between studies.

People using iPhones and Androids organized their icons in five different ways [3]: (1) usage (e.g., frequently used on the front screens); (2) relatedness (e.g., all social networks together); (3) usability (e.g., icons placed within easy reach of the thumb); (4) aesthetics (e.g., according to color); and (5) external (e.g., order of app installation). Usage and relatedness were the two most popular organizational techniques used.

Android phone users tended to put the apps they use most frequently where they could be reached quickly with a thumb (i.e., the home screens and the favorites tray) [5].

STUDY 1

Study 1 looked at how a group of students modified their smartphone.

The Google Android smart phone has three types of screens: home screens, where users can put shortcuts to apps and widgets; all apps screens, where the entire list of apps and widgets installed on the smartphone are displayed; and recents screens, with the list of recently used apps. The favorites tray appears at the bottom of the home screens and displays a small number of specific apps for easy access.

Participants

For the Smart Campus project, we recruited a class of 88 computer science students following an HCI class. The majority of these students were undergraduates, but a few (5) were Masters Students. Of these students, 79 (73 male) furnished us with screenshots of their smartphones.

Material and Methods

Each student received a Samsung Galaxy SII Android 4.0 smartphone. This particular phone came bundled with 53 default apps and widgets, preinstalled by Google (native Android apps, e.g., Gmail), by the phone manufacturer Samsung (branded apps, e.g., Samsung Apps) and by the service provider TIM (branded apps, e.g., Servizi TIM). Students did not have any restrictions with regards to what apps or widgets they could put on the smartphone; however, they were not able to remove the branded apps/widgets. We paid for 20 GB of Internet data access per month to make sure they could use our Smart Campus apps from anywhere and at any time.

Approximately six weeks after they had received the smartphone (late November 2012), the students were asked to submit screenshots of the home screens and applications screens as well as information on whether they had added a cover to their mobile, and whether they had changed their launcher or their keyboard. We received a total of 658 screens, including home screens, app pages, lock screens, settings, folders, keyboards, and pictures of the phone or cover.

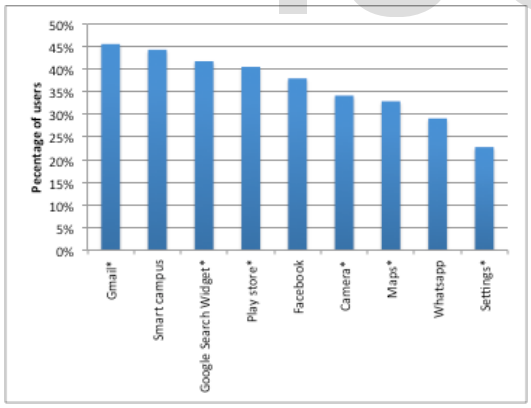

Fig. 1. Top 9 apps put on home screens according to percentage of users (default apps marked by an *).

Results

We use the term appearance personalization [8] to refer to changes made to the exterior (e.g., adding a cover) and appearance (e.g., changing the wallpaper). Only 35% of our respondents used a mobile cover. However, the vast majority (94%) changed the wallpaper; the main reasons given were aesthetic, although a few mentioned wanting to reduce battery consumption.

We use the term functionality personalization [8] to refer to the changes made to the launcher, the apps, and the favorites tray. The majority (60%) of participants modified their launcher, either to improve the functionality, the customizability, or the aesthetic appearance.

The number of apps downloaded varied greatly between participants, from a minimum of 2 to a maximum of 78 (average = 21). In total, 533 apps were downloaded from 24 Google Play Store categories. The most numerous apps (146) were downloaded from the games category, followed by tools (77), productivity (43), and communication (35). Because several of the Google Play Store categories serve a similar purpose, and to simplify things, we regrouped the categories into 10 super-categories, for the following download results: (1) 222 entertainment apps (regrouping games, music & audio, entertainment, media & video, and sports); (2) 125 tool apps (tools, productivity, business, file manager, and market place); (3) 51 social apps (communication and social); (4) 37 reference apps (books & references, news & magazines, education, libraries & demos, and comics); (5) 29 personalization apps; (6) 21 travel apps (travel & local and transportation); (7) 16 photography apps; (8) 15 lifestyle apps (health & fitness and lifestyle); (9) 9 market apps (shopping and finance); and (10) 8 weather apps.

Almost all participants (98%) moved apps to their home screens. A total of 155 different apps or widgets (including 40 of the default ones) were placed on the home screens. Figure 1 shows the 9 most popular apps on the home screens. Table 1 shows how many different apps in each super-category were put on a home screen, as well as which apps were the most popular in each of these super-categories.

The original default apps in the favorites tray were Telephone, Contacts, and SMS. People tended not to change the tray, but when they did, it was most often to put the Internet app (43% of users).

STUDY 2

TABLE 1
NUMBER OF APPS IN EACH CATEGORY PLACED ON THE HOME SCREENS, WITH MOST POPULAR APP/WIDGET(S) AND NUMBER OF USERS

Super-category	# of apps	Most popular app(s)
Tools	45	Google Search Widget (33 users)
Entertain-ment	40	Media Player (10)
Social	29	Gmail (36)
References	12	Play Books, gReader, Currents (2)
Travel	7	Maps (26)
Photography	6	Camera (27)
Lifestyle	4	(all 4 have 1 user)
Market	4	(all 4 have 1 user)
Personaliza-tion	4	Clock Widget (14)
Weather	4	Weather Widget (13)

We sent a survey to Smart Campus participants to explore how they used the smartphone.

Participants

We recruited 194 participants (45 women) both from the original group as well as new project members. Age varied between 20 and 57 (average = 24).

Material and Methods

An online survey, created with Google Docs, asked students about their behavior regarding apps and wallpaper. The students filled out the survey in February 2014.

Results

Fig. 2. displays how often the participants reported changing their wallpapers and downloading apps. Both activities were reported as tending to be done somewhat frequently (one to a few times a month).

The majority of people reported putting the apps they used most frequently on a home screen (59%), while only 4% reported putting the app in the favorites tray. The rest left them in the apps screens.

When asked to name up to four apps they use every day, participants mentioned 149 different apps, mostly in the social, tools and entertainment super-categories. Three apps dominated: Facebook was mentioned by 64% of the respondents, Gmail by 59%, and Whatsapp by 52%. The other apps were mentioned by less than 15% of the participants each.

Participants were asked to estimate how frequently they used their phones for various activities. We report here only the most popular daily activities: chatting with friends (83% of users), searching (68%), emailing (31%), watching videos (29%), and playing games (26%).

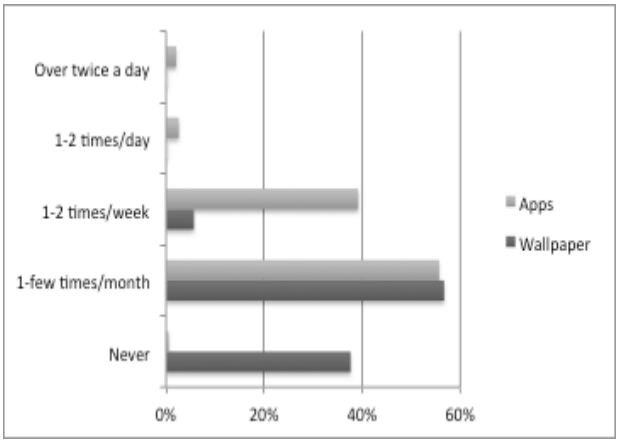

Fig. 2. Frequency of app downloads and wallpaper changes according to percentage of users

STUDY 3

We conducted interviews with students as they left the Smart Campus test group.

Participants

Among the students leaving the project (usually because they were graduating/leaving the city), 52 (8 women) agreed to respond to an exit interview.

Material and Methods

A short interview (usually lasting between 10 and 20 minutes) was conducted with students when they returned the smartphone. This interview covered a variety of themes. Here we look at two in particular: personalization and perception of the smartphone.

Results

Students were asked if they had personalized their smartphone in any way. Many students mentioned functionality personalization through app download (usually socialization apps) but also sometimes by changing the launcher. Several students also mentioned appearance personalization, by making the screens more aesthetic and, more rarely, by adding a cover.

We also probed students concerning the positive and negative aspects of having a smartphone. On the positive side, three themes dominated: (1) socialization: "it is easier in a certain way to keep in touch with people you don't hear from often" ; (2) constant Internet connection: "(…) everywhere you are, you can instantly get answers to your questions"; and (3) usefulness: "in the

beginning (having a smartphone) seemed like throwing money away; however being able to use it autonomously at home, I realized it is not throwing money away, in the end it is useful". On the negative side, two themes dominated: (1) alienation: "(…) not only creates an isolation at the moment when you use it, but it also isolates you from society"; and (2) addiction "some people (…) focus their life only on their smartphone". Somewhat less frequently mentioned negative themes were wasting time and being distracted by the phone.

DISCUSSION

This study, we looked at how students equipped with an Android smartphone personalized and used their device. Our students appropriated the phone both through aesthetic changes and functionality changes, with communication, information, and entertainment dominating app choices and usage. Our results are somewhat similar to those in [6], which found that Korean university students most often used communication (e.g., SMS or social network apps) and information tools (e.g., maps, dictionaries) on their smartphones. In that study, the author noted that communication apps supported the users' need for socialization while the information apps supported their need for a sense of confidence. In our study, we found that, in addition to those two needs, smartphone use also supported students' hedonic needs.

According to [10], personalization promotes autonomy, competence, and relatedness. Autonomy concerns the feeling of freedom, of doing what one wants. On the positive side, our participants displayed autonomy by the various ways in which they adapted the smartphone to their own needs; but there was also a negative side, with students worrying about the addictive nature of smartphone use. Competence concerns the ability to accomplish things in an efficient manner. On the positive side, our students praised the smartphone as a useful tool that lets them find answers anytime, anywhere; but here too there was a negative side, with mentions of wasting time on the phone and being distracted by the phone. Relatedness concerns a person's social needs and the emotions surrounding it. On the positive side, our participants praised most often how they could stay in quick and easy contact with friends and family; again, there was a negative side, with mentions of alienation from the people physically around them through constant use of social networks and, paradoxically, of being unable to get away from people because of the constant connection.

In summary, our results showed that our participants almost always took the time to personalize the smartphone to their own tastes and needs, even though they knew it was a temporary loan. Students' relatedness needs were supported through use of social/communication apps and constant connection, their utilitarian needs were supported through use of tool apps, changes to the launcher and constant connection, and their hedonic needs were supported through aesthetic modifications and use of ludic apps.

There are limitations to this study. Most of our participants were male and came from the same department, severely curtailing sample diversity. As computer science students, they may have been more comfortable with smartphones than the average population; it is possible, for example, that a different group would not have as many people changing their launcher. Finally, we did not collect actual usage data.

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