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Abstract. The e-Cidadania research project investigates solutions for the interaction design of systems that make sense to the Brazilian citizens. By studying the relationships established around people in their informal networks and the way they interact with each other and with technology, we have been developing an Inclusive Social Network system, named Vila na Rede. To cope with the different interaction needs present in the population, Vila na Rede has been planned to be a tailorable system. This report describes and discuss results of a participatory practice in which participants with different interaction needs built design representations for the system. From the final designs, several norms that represent the system tailorable behavior were defined.

Keywords. Inclusive Social Network, Vila na Rede, Interaction Design, Tailoring, Participatory Design, e-Cidadania.

1. Introduction

With the advent of Web 2.0, systems that allow interaction between people, their sharing of information and the formation of groups - the so-called Social Networks Systems (SNS) – are no longer a trend and irreversibly settled. Considering that they can cover any subject, allowing sharing in contexts other than office work, this technology has contributed to the SNS socialization (Figueredo et al., 2009). Nevertheless, the interactivity of the current SNS meets the needs of only part of the population. Figueredo et al. (2009) evaluated nine systems considering the requirements of interaction including those coming from users with low literacy, little or no experience using computers or some type of disability. The results indicate the need to explore new design solutions to benefit a greater number of Brazilian users.

The e-Cidadania research project[1] aims to contribute in this direction investigating solutions for the interaction design of systems that make sense to the Brazilian citizens, to support the constitution of a culture mediated by Information and Communication Technologies in our society. This project addresses one of the grand challenges in Computer Science research in Brazil for the next years, the Participatory and Universal Access to Knowledge for the Brazilian Citizen" (Baranauskas and de Souza, 2006). By studying the relationships established around people in their informal networks and the way they interact with each other and with technology, we have been developing an Inclusive Social Network system, named Vila na Rede[2]. To this end, we have been conducting workshops built upon techniques from Participatory Design (PD) and grounded on Organizational Semiotics (OS) artifacts.

To cope with the different interaction needs present in the population, Vila na Rede has been planned to be a tailorable system. Applications that allow tailoring offer end-users the possibility to adapt the software to their personal preferences or changes in the task, after the software implementation (Slagter et al., 2001). Tailoring involves the concept of "design for change", offering the flexibility of being adapted to different organizational contexts or not anticipated situations of use, or those that have changed (Henderson and Kyng, 1991). Based on PLu*R*aL (Neris and Baranauskas, 2010) – a framework for designing tailorable user interfaces, drawing different design representations that cover the diverse interaction requirements help to determine the system tailorable behavior.

This report describes a participatory practice in the scope of e-Cidadania project in which 14 participants with different interaction needs built design representations for the Vila na Rede system. Four groups participated during the 9th workshop at a Telecenter in the Vila União neighborhood and 1 group participated latter on in a test scenario at NIED/UNICAMP. From the final designs, several norms that represent the system tailorable behavior were defined. The report is organized as follows: section 2 presents works related to participatory design and tailoring and summarizes part of the PLu*R*aL

[1] http://www.nied.unicamp.br/ecidadania

[2] http://www.vilanarede.org.br

which supported the norms specification; section 3 describes the participatory practice considering the participants' profiles, artifacts and activities; section 4 analyses the final designs and determines the tailorable behavior; finally, section 5 concludes.

2. Related works

Unlike conventional applications, while designing tailorable systems, designers need to foresee different possibilities of use, including the evolution of users and the use in different devices and environments. It is important to note that activities related to the concept of tailoring involve not only elementary changes in the user interfaces such as changing color or font size, but include them as well. The visibility of new features, which becomes relevant in new contexts of use and tasks optimization are also possibilities inherent in the concept of tailoring. Therefore, the identification of the diverse interaction needs is an important step while designing tailorable systems.

PD has been pointed out in literature as an interesting approach to design tailorable applications. MacLean et al. (1990) have already alluded to PD in the beginning of the 90's, mentioning that the Scandinavian approach could benefit the establishment of a culture about tailoring. Kjær and Madsen (1995, p.54) reinforced the importance of the PD in the elicitation of requirements for flexibility. They said: "... flexibility is not related to the regular procedure or behavior pattern of doing things, but the unexpected, unprecedented, exceptional cases, situations and events experienced only by those who perform the work daily". They concluded that PD techniques might be applied to capture the knowledge about the exceptional cases. Stiemerling et al. (1997) and Costabile et al. (2003) also adopted approaches based on workshops considering users, designers and software engineers. However, to achieve this more comprehensive view, variety should be considered while inviting people for the participatory practices.

Besides a PD approach, the design of tailorable systems demands a structure consisting of guidelines, mechanisms, methods and systems used in the design planning and decision-making. In this sense, Neris and Baranauskas (2010) defined PLu*R*aL - a

framework to be used by designers that comprehends since the interaction requirements elicitation to the generation of design representations and functional specifications, including the tailorable behavior.

PLu*R*aL is based on OS concepts and is organized in 3 pillars: the 1st one brings out the signs of interest in the domain (being them related to users, devices or environment) and formalizes non-functional requirements that the tailorable system should cope with. The 2nd pillar benefits from the Semantic Analysis Method and Norm Analysis Method (Stamper et al., 1988) allowing a consistent view about the domain, which includes the norms that govern the agents' behavior, and assist the formalization of functional requirements. In the 3rd pillar, the tailorable design solution is built up and a norm-based structure formalizes the system tailorable behavior.

According to PLu*R*aL, only drawings are not enough to represent the diversity of facets a tailorable system may have, hence a more formal approach needs to be adopted. Therefore, the framework applied the OS concept of norms. As norms express how agents behave in society, the same structure was adopted to model the behavior of tailorable systems. An instance of the format proposed for behavioral norms is suggested considering context, functionality and interface elements, as follows:

WHENEVER (d, e, u) IF (f, r) THEN <system> IS <deontic operator> TO show ∑(i, m)

where:

d: device, e: environment, u: user

f: functionality, r: representation

deontic operator: must, may or may not

i: interface element, m: mode (position, size, shape, color, type, instance)

The context is defined by a *tuple* formed by device, environment and user characteristics. When the condition is satisfied, i.e. the system starts a specific functionality in a specific representation (as the same functionality may have more than one user

interface), then the tailorable system must, may or may not show a group of interface elements in a certain mode. The proposed format allows modeling a great variability of changes and designers can specify since simple situations as "every time the application is running on a cell phone, contrast option should be on" to more complex ones involving specific behavior of different interface elements (whenever (Computer, in the office, attendant) if (check appointment, appointment report) then drugstore_system should show [(language style, "formal_semantics.txt"); (logo, Healthy ministry)].

It is important to mention that, in OS, the original concept of norms is related to the organization behavior and the structure of behavioral norms requires an agent (affordance with responsibility) as the responsible for the action. The same norm structure was adopted in PLu*R*aL intending to represent a certain behavior; in this case, the system behavior. The software system is itself an agent that will display a set of interface elements in a certain mode. This view considers the system as an active artifact capable of doing tasks in different contexts. However, it is known that the system software is not an agent in the sense OS proposes, since the responsibilities are always associated to the human agents behind the system.

The norm format proposed in PLu*R*aL was used to formalize the Vila na Rede tailorable behavior which mainly emerged from the participatory practice described in the next section.

3. Participatory practice

The participatory practice happened in two different moments. Four groups participated during the 9th Semio-participatory Workshops from e-Cidadania project that was held on the 31st of August, 2009 at a Telecenter at Vila União, Campinas. In total, 24 participants took part in this activity, being 13 researchers (from e-Cidadania project and invited researchers) and 11 from the community. One more group participated in the practice on the 29th of January, 2010 at the Nucleus of Informatics Applied to Education (NIED).

Considering both moments, 14 participants from the community with different profiles were involved. Their ages varied from 18 to 61 years old. There were 2 men and 12 women. One participant is deaf. Regarding schooling level, 5 declared to have stopped studying at or after elementary school, 4 at after high school, 3 after college, and 2 have post-graduation degree. Eleven of them declared to have computers at home although only 10 declared to access Internet.

Participants worked in 5 groups (4 with 3 participants and 1 with 2 participants). The groups were divided following the characterization proposed by Neris et al. (2008) that considers knowledge about the domain and ability with technology. As all participants are users of the Vila na Rede system and have already used functionalities as to post, read or comment an announcement at least once, the main criterion used to group the participants was their ability with technology in general. Therefore, in G1 were the users with less ability, followed by participants from G2 and G3. Participants from G4 and G5 were considered with similar levels of ability with technology, i.e. those that use computers frequently.

The practice proposed 3 activities related to ordering announcements, re-constructing an interface and answering a questionnaire about tailoring. The ordering activity aimed to identify the different criteria (filters) the users would apply to organize information. The second activity was designed to elicit the different interaction elements each group would apply and in which mode (position, shape, color). The third activity aimed to know the participants' emotional reaction to tailoring.

First, each group received 45 cards representing real announcements available at Vila na Rede. The cards contained information as the category (products and services, events or ideas), title, author, date and time of creation, date and time of last change, date and time of the last visit, number of comments, number of visits and media included (pictures, sound or video). The groups were asked to order the cards using a criterion that would make more sense to them, as shown in Figure 1a. They took about 35 minutes discussing and ordering the cards.

Figure 1. (a) Participants ordering cards and (b) building an interface.

Afterward, participants received a kit with pictures of interaction elements in different colors and sizes, colorful pens, pencils, erase, glue and a cardboard imitating a computer screen with an opened browser window, as shown in Figure 1b. Participants were asked to build an interface in which the announcements (cards ordered in the previous activity) would be listed. They could use the pictures from the kit or draw new ones. The groups took at about 60 minutes to build an interface and after that each group explained its proposal to the researchers.

After the design activity, participants individually answered anonymous questionnaires with 2 simple questions: 1) what do you think about building Vila na Rede according to your preferences? and 2) imagine that you can change the size, color and position of things at Vila na Rede. What would be your main motivation to change something?

The results of the 3 activities were compiled and are presented and discussed in the next section.

4. Results

The activities developed during the workshop supported results related to content presentation, interface elements and emotional factors regarding tailoring as easiness of changing and motivation. The criteria for ordering the cards helped the decision about which filters should be offered and which criterion should be the default to organize the announcements. The design with the cardboards supported comparisons regarding interface elements chosen or created, their position and size pointing out opportunities for tailoring. The questionnaire allowed some initial hypothesis about the participants' feelings regarding tailorable systems. The analysis and discussion are presented in sub-section 4.1 and the norms arising from the activity with the cardboards are exemplified in sub-section 4.2.

4.1 Analysis and Discussion

The groups chose different criteria to order the announcements, as summarized in Table 1. G1 first selected the announcements with pictures and then organized them by their title (mixing the categories) as they would tell a story about a person's trajectory using the system. One of the participants explained: "One person first learns these things [shows several announcements about craftwork] and them she recuperates the happiness [title of the last announcement in the selection]". Another G1 participant also exemplified another trajectory: "It is a history from housecleaning to the craftwork". At last, they grouped the announcement in thematic groups (e.g. environmental education, craftwork, free courses and cultural events). Even inside a thematic group, the criterion is also related to situations in the real life. In the environmental education theme, for instance, they first ordered announcements related to the educational space at a telecenter, then access to email and participatory practices, followed by lectures and at last the critics related to the theme. They also gave preference to their own announcements and then to those from people they know.

Table 1. Criteria for ordering announcements chosen by each group.

Group	Criteria
G1	Announcements with pictures Title (as hints for the person's trajectory using the system) Thematic groups (e.g. environmental education, free courses)
G2	Number of visits Thematic groups (e.g. health, craftwork)
G3	Last posted (products and services, ideas) Next to come (event)
G4	Media and price (for products and services) Range of time (event) (e.g. in a week or month) Author and then alphabetic order of titles (idea)
G5	Last posted

G2 initially opted for keeping the pre-determined categories (products and services, events and ideas) and selected to order the announcements inside a category by the number of visits. They said: "if there are lots of visits then people are interested in the announcement". However, after discussing a little more they decided to re-order the cards considering thematic groups as health, beauty and craftwork (they mentioned the groupings found in commercial phone directories as examples). The themes would be organized by importance. They said: "Health is more important therefore it comes first". At the end, they faced the problem of having several different themes and announcements that did not fit very well in any of them. As a result, they returned to the number of visits criterion and suggested a new category that would group all the announcements.

G3 was composed by participants that are casual users of computers. After discussing a lot, they decided to keep the actual default order (last posted) to announcements about products and services and ideas. However, they suggested a different approach for filtering events. They would like to list these announcements by the initial and final dates of the events.

G4 and G5 were composed by participants considered fluent in using computers. They kept the actual system categories but suggested new filters contextualized to each category. For products and services, G4 proposed to filter by price. For events, they

proposed to filter using a certain period of time as a week or month. For ideas, they suggested to filter by the author's name and then by the titles alphabetically ordered.

From the criteria suggested by the groups, it is interesting to mention that G1 and G2 used their life experience to organize the information, considering thematic groups. This result shares with those seen by Neris et al. (2008) regarding the influence of the domain in groups that are not used to technology. The other groups kept the categories already presented in the system but added more sophisticated filters as price or date of the events.

The panels designed in the cardboards during the 2nd activity can be seen in Figure 2. The one in the first cell (up left) was produced by G1. G2 board is shown in the up right cell. G3 and G4 boards are in the middle line and the one produced by G5 is in the last line. The analysis summarized in Table 2 considered which interface elements were added and in which position and shape.

From the panels presented in Figure 2 and the information in Table 2, it is possible to see that the elements logo, register, login and contact buttons, font size buttons, menu, who is online, and the pool tool, showed up in all proposals. However, it is interesting to note that the logo was added in a video format (passing first ideas about the system) in 2 of the proposals. The menu's shape also varied. In 3 of the proposals, it appeared in a circular shape. Moreover, in one of the proposals a new category was added (all), grouping the announcements of products and services, ideas and events. The buttons also varied in position, size and color.

The navigational arrows (a resource added by designers to support users not familiar with the scroll bars – see Neris et al., 2008) showed up in the proposals of G1, G2 and G3, but were not added by the expert users. In addition, G4 suggested that the pool tool could be presented in a retractile shape, which is common in other web applications. Finally, the LIBRAS button was added in 4 proposals and in 2 of them (G1 and G5 in which the deaf user was included) in the middle and in big size.

Figure 2. Cardboards with the different interfaces to list announcements.

Table 2. Main interface elements, position and shape.

Group	Element	Position and shape
G1	Video presenting the system	Up left side, in the logo position
	Register button	Up left side, beside video, big size
	Login and logout buttons	Up left side, under video, big size
	Menu	Middle left side, circular format
	Who is online and users online	Down left side
	Contact, comment and collaborate buttons	Up middle side, big size
	Announcements	Middle, presented in a ladder format
	Audio, video and LIBRAS[3] buttons	Middle, under announcements, big size
	Search box and button	Middle, down position
	Institutional support bar	Middle, under search box
	Font size buttons	Up right side, green color
	Pool	Middle right side
	Navigation arrows	Down right side
G2	Logo	Up left side
	Login and register buttons	Up left side, under logo
	Menu + new category (all)	Middle left side, linear format
	Who is online and users online	Down left side
	Announcements	Middle, two columns
	Navigation through media	Middle, down position
	Search box and button	Middle, down position
	Institutional support bar	Middle, under search box
	Font size buttons	Up right side, orange color
	Pool	Middle right side
	Navigation arrows	Middle right side
	Announce, collaborate and contact buttons	Down right side, big size
G3	Logo	Up left side
	Register, login and logout buttons	Up left side, under logo, big size
	Menu	Middle left side, circular format
	Who is online and users online	Down left side
	Radio tool	Down left side, under who is online
	Video	Down left side, under radio tool
	Chat tool	Besides who is online
	Announcement	One in the middle

[3] LIBRAS is an acronym that stands for the Brazilian sign language in Portuguese. The LIBRAS button starts a video with an interpreter.

	Comment, collaborate and video buttons	Middle under the announcement
	Navigation (including back) buttons	Middle down
	Font size buttons	Up right side, orange color
	Search box and button	Up right side, under font size buttons
	Pool	Middle right side
	Navigation arrows	Middle right side
	LIBRAS button	Down right side
	Contact button	Down right side
G4	Video presenting the system	Up left side, in the logo position
	Register, login, announce and logout buttons	Up left side, under video, big size
	Search box and button	Up left side, under buttons
	Menu	Middle left side, circular format
	Announcements	List in the middle
	Navigation buttons	Middle down
	Logo, contact button and institutional bar	Middle down under navigation buttons
	Font size buttons	Up right side, orange color
	Video	Up right, under font size buttons
	LIBRAS	Up right, under video
	Pool	Middle right side, retractile
	Who is online	Down right side
	Chat	Down right side, under who is online
G5	Logo	Up left side
	Font size buttons	Up left side under logo
	Contrast buttons	Up left side under font size buttons
	Help tool	Middle left side
	Contact button	Middle left side
	Pool	Down left side
	System name	Up middle
	Menu and announce button	Up middle, linear format, horizontal
	Announcements	Middle, organized in a queue
	System presentation, video and LIBRAS buttons	Down middle side, big size
	Login, logout and register buttons	Up right side
	Who is online and users online	Middle right side
	New users	Down right side

The answers in the questionnaires suggest that tailoring is not an easy task; even though users recognize they could benefit from a tailored system (see Table 3). In answers for the 1st question, 5 users pointed out that it is not easy to choose what they want and 3 of them prefer to let the system as it is. This result agrees with Mackay (1991) when she says that many users do not tailor because they do not know how to do it. However, in the 2nd question, 8 users answered with good reasons for tailoring (3 of them think they would spend less time to find things, 4 said that interaction would be simplified and 1 said that s/he could place elements in a way s/he is used to). These data also signalize the need of investigating how to offer tailoring in a simpler way. In this direction, Wulf and Golombek (2001) proposed the principle of "direct activation", i.e. tailoring options should be presented close to where they would be used and preferably in a graphic way. Moreover, some options could be offered in an adaptative approach, when the context is captured and the system changes without the explicit involvement of users.

Table 3. Answers to the questions related to emotional factor regarding tailoring.

Q1) What do you think about building Vila na Rede according to your preferences?	
Votes	**Answer**
5	It is difficult to choose what I want to add
3	I prefer to let it as it is available now on internet
4	I liked to tailor it
1	Another: "It makes the system more comfortable"
Q2) Imagine that you can change the size, color and position of things at Vila na Rede. What would be your main motivation to change something?	
5	I would like to let it as it is
0	I would be happy to organize things in my way
3	It would be faster for me to find things
4	It would be simpler for me
1	Another: "It is good as it is, but change is also good", "Elements could be placed as in the applications I am used to", "Organize announcements as in the phone directory".

4.2 Vila na Rede tailorable behavior by norms

The results presented and discussed previously demonstrate that Vila na Rede should "behave" in different manners to cope with the diverse interaction requirements pointed out by the participants of the practice. Considering these results, some norms representing the system tailorable behavior were formalized as exemplified in Table 4. The adopted norm format follows PLu*R*aL (Neris and Baranauskas, 2010).

Table 4. Examples of norms representing Vila na Rede tailorable behavior.

Context			Condition		Tailorable behavior
device	environment	users	functionality	representation	element and mode
Computer	any	any	show_menu	div_menu	(menu, linear or circular)
Computer	any	deaf	any	any page with text	(LIBRAS button, big)
Computer	any	expert	navigation	div_arrows	(disable_button)
Computer	any	expert	pool	div_pull	(pool_presentation, retractile)

Interaction requirements arising from previous practices in the context of e-Cidadania project were also considered and a more comprehensive list of norms representing the Vila na Rede tailorable behavior can be found in the Appendix A (in Portuguese).

These norms represent a designer perspective constructed upon data from participatory practices, and after their specification, an infra-structure should be adopted to implement the tailorable behavior. In the context of e-Cidadania project an extension to the infra-structure proposed by Bonacin and Baranauskas (2005) has been developed (Fortuna, 2010).

5. Final remarks

This report presented a participatory practice, conducted in the context of e-Cidadania project, to elicit the different interaction requirements and formalize norms that represent the Vila na Rede system tailorable behavior. The results suggest that users not familiar with technology use their life experience to organize the information, considering for example thematic groups to filter announcements. Moreover, the activity with the cardboards emphasized the need of tailorable systems exemplifying the different elements and shapes adopted by the participants.

Future work includes the selection of some norms to be implemented and tested in further work.

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