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An exploratory design for inclusive social networks

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Abstract

The Brazilian society faces today a situation characterized by enormous differences with regard to socio-economics, culture as well as access to technology and knowledge. This Technical Report, developed within the project e-Cidadania, contributes with investigations regarding new methods of design to address the questions a system opened to the differences raises. Here we present preliminary results of a design proposal for a system to support an inclusive social network. Considering the concepts of Universal Design and using techniques from Participatory Design, we propose an approximation to the system design and the list of non-functional and functional requirements. The design decisions were recorded in a Design Rationale document.

1   Introduction

We are today facing a situation in Brazil that is characterized by vast differences with regard to socio-economics, culture, geographical region differences as well as access to technology and knowledge. Social indicators presented in the Statistical Yearbook of Latin America and the Caribbean[1] show that in 2006, about 64 million Brazilians or 33.3% of the population lived below the poverty line. Furthermore, according to the Indicator of Functional Illiteracy (INAF Indicador de Analfabetismo Funcional), 37% of the population between age 15 and 64 are either illiterate or possess only rudimentary literacy skills[2], i.e. are able to extract explicit information from short texts like newspaper headlines or ads. Moreover, the census

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[1]`http://www.eclac.cl/cgibin/getprod.asp\?xml=/publicaciones/xml/8/32598/P32598.xmlExsl=` `/deype/tpl/p9f.xsl\&base=/deype/tpl/top-bottom.xsl`

[2]`http://www.ipm.org.br/ipmb\_pagina.php?mpg=4.02.00.00.00\&ver=por`

of 2000 found that 24.5 million Brazilians or 14.5% of the population have some kind of impairment[3].

According to the 4th Grand Challenge of the Brazilian Computing Society (SBC Sociedade Brasileira de Computao), this is a scenario for which there exists no previous experiences to get inspiration from [4] and where the challenge is unique: to let the citizens benefit from Information and Communication Technology, via user interfaces and thus promoting the process of the constitution of a fairer society, embracing different competencies and needs among people.

Within this context, the project e-Cidadania: Systems and Methods for the Constitution of a Culture mediated by Information and Communication Technology (FAPESP / MS # 2007/54564-1) main objective is to investigate and propose solutions for interaction and interface design for systems related to the exercise of citizenship. Our scenario considers the diversity of users and takes the digital excluded into account (including illiterate and people with disabilities). In order to accomplish that, a "virtual communication space"is expected to be developed, based on the concept of social networks. It should be inclusive, allowing the community to share knowledge about the social group's know-how. This space has to be generalized in order to facilitate "exchanges"(of knowledge, goods and services) in accordance with the collaborative (project team, partners, community) system conception.

This Technical Report, developed within the project eCidadania, contributes with investigations regarding new methods of design to address the questions a system opened to the differences raises. We present preliminary results of a design proposal for a system supporting an inclusive social network. Considering the concepts of Universal Design [40] or Design for All and using techniques from Participatory Design [37], we proposed a rough approximation of the system design and the list of functional and non-functional requirements. The design decisions were recorded in a Design Rationale document. Hence, the main objectives of this Technical Report are:

- to present the methods used and the approach to get this first design proposal;

- to show the initial design achieved;

- to discuss the main concepts, interaction areas, requirements and design decisions.

The Technical Report is organized as follows: Section 2 presents the challenges of designing online social networks and interfaces for diversity and collaboration; Section 3 presents a selection of current tools that support social networks and compare them considering technical aspects; Section 4 presents the methods used and details of their application; in Section 5 we discuss the design proposal; Section 6 concludes.

2   Designing online social networks

In the process of exercising citizenship, communication is a fundamental component. Organized groups and communities have a proper way to spread news among participants,

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[3]http://www.ibge.gov.br

share information and exchange knowledge. One of the goals of e-Cidadania is to create virtual spaces for this communication to take place, considering the online social networks. The tools for communication and expression should provide all users - in its vast variety of gender, age, abilities and disabilities - with an opportunity to create a digital culture among them, making the system part of their social life.

According to Capra [5], social networks can be defined as communication networks. There is consensus among many authors [6, 43, 32, 39, 33] that these networks not only allow the dissemination of information and knowledge, but also play an important role in the adoption of ICTs by its users. This adoption is valuable, especially considering the digital divide we have in our country. However, according to Wellman [43] it is necessary to design tools so that people can navigate and find knowledge in networks that now may look complex and fragmented. The e-Cidadania project intends to go in the direction where communication is crucial to maintain cohesion among social groups. When we realize that these groups comprise blind, deaf, illiterate, and people having other kind of cognitive or motor impairments, we notice that we face an even greater challenge.

Although there are many different computer mediated systems developed to aid people in activities of communication and cooperation, their design do not address the challenges of the design for diversity, with all the implications mentioned earlier in this report. Designing online social networks under the Design for All paradigm is a big challenge. The research activities conducted within this project have focus on this challenge and will be described further on.

2.1 Challenges to the design for diversity

The design of "Interfaces for All"aims at addressing efficiently and effectively the various interaction problems arising from different user abilities [38]. According to Stephanidis, the underlying principle is to ensure during the design process, that the needs of e.g. elderly and people with disabilities are considered. To that end, it is important that these needs are known since the early stages of product and service design. This approach eliminates the need for "a posteriori"adjustments and makes it possible to offer products that meet the demand of end users in the population.

It is possible to encounter literature addressing the design of interfaces for specific classes of users. For example, people with disabilities: blind and the deaf [1, 7, 14, 12]; illiterate and semi-literate [2, 27, 28]; users unfamiliar with technology [8, 42]; and elderly [23, 24, 35], among others. However, even considering the classes of users individually, design problems still persist. For example, in the case of people with disabilities, only the use of assistive technologies (such as screen readers or automatic translators) and adherence to the accessibility recommendations found in literature are not enough for the effective interaction of these users. Recent studies [29] show the need of bringing these people to the design process to understand their needs and design with and for them.

As another example, for the interaction of illiterates or people with low literacy skills we can find research results that propose interfaces without text. However, despite the fact that these interfaces allow users to have access to the content by images and sounds, they do not provide the user contact with text, which is known as central to the promotion of the

reading capacity. In a disadvantageous social context as we live in Brazil, the user interfaces should be considered also as a means of promoting intellectual growth to the citizen.

Challenges of Design for All go beyond the problems found for separate classes of users. Design for All means designing interfaces enabling access to users with diverse competencies in the population in a non-discriminatory way, meaning to offer the possibility of interaction and access to the content in ways that make sense for people considering their different abilities.

In this work, we draw on the idea of tailoring to design for diversity. "Tailoring"can be understood as "the activity of modifying a computer application within the context of its use"[22]. By using tailorable applications, specialists on social inclusion, domain experts and the users themselves could adapt and maintain the system according to individual and collective requirements. This will require extending and adapting functionalities and user interfaces to fit different users and use contexts [21]. Tailoring involves the concept of "design for change", in a way to provide the flexibility of being customized to different organizational contexts or not anticipated situations of use, or those that have changed [18]. The main benefits that can be obtained with this mechanism, emphasized by literature are: more efficiency [26], more satisfaction of use [34] and a smaller learning curve when an application is replaced [25, 34]. In this work, we consider tailoring that is done explicitly by the end-user.

Designing for flexibility involves many people, with different skills, interests and levels of commitment, including designers, developers and users. In this work, we address these questions using techniques from Participatory Design.

2.2   Challenges to collaboration

As emphasized by Grudin [15], collaboration is a sign of maturation in the use of computers. Nevertheless, collaborative applications involve a number of areas as anthropology, social psychology, economy, education, organizational theory [16] and computer science; and, in all of these areas there is significant lack of answers to collaborative application issues. Regarding the context of this work we aim to shed light on topics like awareness, interaction levels, privacy and security. Awareness is a complex feature to establish and maintain in collaborative applications. Gutwin & Greenberg [17] pointed out the difficulty to maintain awareness in real-time distributed systems due to poor and foreign mechanisms in relation to be aware of people in a real world communication. Presenting relevant and sufficient information regarding awareness to people considering the diversity of their needs is a major issue to inclusive collaborative applications.

Interaction levels can be basically categorized as cooperative (i.e., when a group has a common objective which is reached through the division of tasks to be performed by subgroups or individually), collaborative (e.g., when a group has a common objective and works together on the same artifact), mixed (i.e., when people frequently shift from on level of interaction to another [13, 36, 17] and individual (i.e., when, in spite of using a collaborative application, a person is performing an individual task). In addition, interaction levels can beaffected by time (i.e., synchronous, asynchronous) and space (i.e., collocated, distributed). All of these levels should be supported by collaborative applications even

in high heterogeneous communities. Vanderheiden [41] traced some functional constraints of interaction that could be present in social networks: no vision, low vision, no hearing, limited hearing, limited manual dexterity, limited cognition, no literacy, low literacy.

An inclusive social network system should provide an environment where groups can establish their own interactive social protocol [36] based on the communication protocols, tools, time, and space. For this purpose, collaborative applications should support the definition of group specific privacy and security policies to better fit communitys needs and preferences.

3 Systems to Support Social Networks

This section presents a brief exploration of some interesting Web based social networks, some found in Brazilian websites. To better understand the scenario, we classified the analyzed social networks in four categories: donation and exchange of goods and services, knowledge, relationship and citizenship. While analyzing those websites we focused on collaboration mechanisms and interface flexibility.

3.1 Donation and exchange of goods and services

In this type of website people and organizations register goods and services they want to exchange or donate to other people or organizations (see Figure 1). Websites use different criteria to manage exchanges. One very flexible manner is by free negotiation between the owners; people discuss with each other, about the goods and services they registered in the website. Other policies are based on the valuation of the goods and services; people not necessarily make an exchange with the same person interested in a product. For example, when a person registers a product in an exchange website he/she has 0 credits; when somebody chooses one of his/her products, the owner sends the product and gains 1 credit. With this credit he/she can purchase any product registered in the website. Some examples of this category of application are shown as follows.

Agente Cidado (Citizen Agent) (`http://www.agentecidadao.com.br/`). A donation website supported by a team which is responsible for managing the distribution of donations among institutions that will be benefited. There is no direct interaction among donators and benefited institutions.

Permuta Livre (Free Exchange)(`http://www.permutalivre.com.br/`) and **E-trocas** (e-Exchanges) (`http://www.etrocas.com.br/`). Exchange websites that allow free negotiation between the users (including the possibility to use money for negotiating).

In Permuta Livre there are collaboration mechanisms such as posts about products and profile visualization. It is also possible to find some awareness mechanisms such as context orientation, owner's qualifying and geographic filtering. E-trocas offers less collaboration and awareness mechanisms to users (it doesn't offer visualization of users profiles, context orientation and provides only limited geographic filtering).

Agente Cidado and E-trocas offer no options regarding flexibility, In Permuta Livre it is possible to change font type and color (while describing a product). Also, it is possible to

Figure 1: Donation and exchange of goods and services websites

re-order content (different types of data sorting in tables). There is no flexibility regarding the objects (changing position or showing/hiding elements).

3.2   Knowledge

Very welcome uses of social networks in Brazil are those promoting knowledge. Usually, knowledge websites are focused on a specific subject such as academics, computing tips, gastronomy (see Figure 2). Tools such as blogs or forums are often used to promote the communication in this website category. Some examples of this category of application are shown as follows.

EbaH! (`http://www.ebah.com.br/`). An academic social network that provides support for groups with common interests (e.g., courses, universities) and communication (e.g., blogs, forums, file sharing). In spite of the variety of resources and more than 40 thousand registered users, there seems to be relatively few activities going on through the website.

Metareciclagem (Meta recycling) (`http://metareciclagem.org/drupal/`). A portal with the purpose of supporting discussion about metarecycling (i.e., the use of technology to promote social transformation). It offers some collaboration (e.g., blog, shared schedule) and awareness (e.g., user's presence indicator, user's action history) mechanisms.

ECommunita arte e tecnologia (eCommunita art and technology) (`http://www.ecommunita.com/comunidade/`). An enterprise that operates in the domain of social networks and has non-governmental organizations concerned with education as main clients. On its website, eCommunita offers services such as videos, texts, blog, communities and Wikis.

In EbaH! it is possible to show/hide interaction areas where content is present. In

Figure 2: Knowledge websites

Metareciclagem, it is possible to adjust font while posting content. However, the content posted does not reflect the alterations made. ECommunita offers no flexibility for tailoring.

3.3   Relationship

This is the most common category of social network in our country. Relationship networks may have a very specific focus (e.g., Imeen - music, Xing - business, professional) or provide generic mechanisms to support different purposes (e.g., Orkut, MySpace, Bebo; see Figure 3). Regarding market shares, there is no single global leader, but it is possible to identify some tendencies[4]: South America - Orkut (Brazil) and fotolog; North America - Facebook and MySpace; Europe - Bebo and skyblog; Asia - livejournal (Russia) and Orkut (India); Oceania MySpace. Some examples of this category of application are shown as follows.

Orkut (`http://www.orkut.com/`). In 2007, Orkut had about 15 million Brazilian users registered[5]. If we consider that, in 2007, about 32 million Brazilian people accessed the Internet[6], this means that about 50% of the Brazilian population have an Orkut account.

MySpace (`http://www.myspace.com/`). Users are informed about the status of the others. Both Orkut and MySpace support Open Social[7], an API to access and interact

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[4]Valleywag.   The world map of social networks.   Available at: `http://valleywag.com/tech/data-junkie/the-world-map-of-social-networks-273201.php`

[5]HTML Staff. Orkut tem cerca de 15 milhões de usuários brasileiros, diz procurador do MPF. Available at: `http://www.htmlstaff.org/ver.php?id=6550`

[6]Agência Brasil.   Brasil ocupa a 62 posio no mundo em relaÇão ao uso da Internet.   March, 23, 2007. Available at: `http://www.agenciabrasil.gov.br/noticias/2007/03/23/materia.2007-03-23.7911528198/view`

[7]Open Social. Available at: `http://code.google.com/apis/opensocial/`

Figure 3: Relationship websites

with other social networks. With this tool, developers can integrate their own applications to bigger social networks and leverage the visibility of their applications.

Bebo (`http://www.bebo.com/`). Offers privacy control even in the user's profile, supports the creation of skins to the profiles and the creation of applications using a sandbox[8].

Facebook (`http://www.facebook.com/`). Launched in 2004, Facebook is mostly used in the United States. A platform that exists since 2007 allows developers to create applications that interact with features of the site.

Xing (`http://www.xing.com/`). Xing is a professional network where people from different areas and from any part of the globe can exchange experiences, search for opportunities and professionals. The site provides more than 25 thousand forums where professionals can contact specialists.

Relationship websites are the most popular networks nowadays and therefore they show a wide range of design solutions. Regarding collaboration, we identified a preference for asynchronous communication mechanisms (e.g., blogs, scrap, forums). We also identified some common mechanisms of awareness as indicators of users status and actions.

About flexibility, Orkut allows language settings and users can configure how much information they want on the pages. It also allows users to hide information. MySpace offers a profile editor that allows the adjustment of color, size and position of links, images and text. Bebo has interface skins. It is possible to create new skins and also make them available to other users. However, it is not possible to change elements size or position.

3.4   Citizenship

This category contains sites that are concerned with different aspects of citizenship. In contrast to the examples we have seen in the previous subsections, the systems in this category act on a more local level, i.e. the determining factors of this type of social networks are not interests such as professional career, music or other hobbies, but local proximity, which of course also implies some kind of shared interests. Thus, systems in this category support communities that are first of all descriptive communities in the sense of Day [11]. These

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[8]Webopedia. What is sandbox? Available at: `http://webopedia.internet.com/TERM/S/sandbox.html`

communities identify themselves by the county, city, etc. their members live in. Therefore systems in this category don't have the same degree of "market penetration" as systems in the categories previously described. Following we give three examples that demonstrate the diversity of social networks in this category. We distinguish three subcategories: top down initiatives driven by government entities, bottom up initiatives by non-government entities and outside-in approaches initiated by third parties outside the local context that offer a service to a government or non-government entity. As far as we investigated , this category of network is not found in the context of our country.

The Moray Council (`http://www.moray.gov.uk/moray\_section/section\_2079.html`). A typical example for a web site initiated by a governmental entity, the Moray City Council is an example for top down initiatives that offer services for the citizens that live in the respective catchments area. The site offers static information about different areas that are relevant to the citizens, e.g. roads and transport, housing, leisure or projects related to learning and education.

Blacksburg electronic village (BEV) (`http://www.bev.net/index.php`). An example for a bottom-up initiative, BEV has been established as a joined effort of Virginia Tech researchers and Blacksburg citizens. It is the most inclusive network in this category since it relies on end user participation from the very beginning. Besides content similar to the previous example, this site contains user generated contents, e.g. entries in the community directory, notification about events, etc. Blacksburg electronic village provides a space where villagers can make available some personal information but there are not collaboration mechanisms.

American Towns (`http://www.americantowns.com/ga/cartersville`). An example of what we call outside-in, the company behind this website provides the software platform and the hosting. The service can be initiated by governmental entities, but also by citizens or the local trade and commerce association. The sites features are similar to the previous example, but the content categories and tools are not tailored to the community, they are off-the-shelf software. American Towns website offers a community area where people can post comments and articles, and a groups & organizations area with available calendars, articles e contact information.

4   Designing an Inclusive Social Network

As discussed in Section 1, a system to support inclusive social networks should consider the vast variety of user abilities in our population. Also, questions regarding collaboration should be addressed for this specific social context. Systems already implemented present different tools according to the scopes (business and exchanges, social or professional relationships, etc.) they intend to support. As discussed in Section 3, concerns about the support to the different competencies of users and the promotion of digital inclusion were not the focus of those systems.

We understand that the development of a system to support inclusive social networks should consider accessibility (not only to get at the content and functionalities, but also to understand it) and digital inclusion since its early stages. Thus, a socio-technical vision of

the problem and a participatory and inclusive approach for the proposal of solutions are necessary. Hence, to obtain a first approximation for the system design, we used participatory techniques adapted to an exploratory design situation. In Section 4.1, we describe the techniques as proposed in literature. In sections 4.2 and 4.3, we present how these techniques were applied in this project and their outcomes.

4.1   Participatory techniques

With the objective of reaching key design concepts and layout proposals, two Participatory Practices were used by the team: the BrainWriting [30, 3] and BrainDrawing [10, 30, 3] respectively; both are briefly described as follows.

BrainWriting: a method that allows sharing of ideas in the form of a circular written brainstorming.
   Process:

1. Make a clear **statement of the problem**;

2. Views generation - **BrainWriting**: Participants write ideas on a sheet of paper and pass the sheet to the next participant. Upon receiving the ideas of another participant, each one must agree, disagree or put a new point of view. This phase continues until all participants have seen the ideas of the other participants at least once;

3. **Synthesize in more elaborate concepts**: the group reduces the list of ideas to a smaller number of more central concepts;

4. **Generate relations between concepts**: each participant completes a table putting their perception of the relative importance between the concepts ($>$,$<$,$=$) between all pairs of concepts;

5. A **"consensus"** is calculated from the table;

6. Critical **assessment** of the results: the group analyses the results and modifies them as necessary.

   Results: List of ideas; synthesis and combination of ideas; list of concepts; ranking of concepts considering importance, critical analysis of the ranking.

BrainDrawing: a method that allows a rough design of UI through a cyclical drawn brainstorming.
   Material: design stations arranged in a circle.
   Procedure: Each participant makes a drawing in one of the original stations, moves to the next station and continues following the drawings found there, and so on. Alternatively participants are in their places and the designs are moved in a circle.
   Results: Generation of many design candidates. Each one is a fusion of ideas from everyone involved. Each design is unique because it had a different beginning.

4.2   BrainWriting in e-Cidadania

Based on the technique previously described, an adaptation was used with the same goal of eliciting and sharing ideas in order to extract key concepts. This adapted technique was applied within a group of eight people, composed by project researchers, target community representative, and an undergraduate student from the area of communications (journalism). Each participant continued the writing of the other, in continuous and timed rounds. Figure 4 illustrates the application of the BrainWriting technique within the group. The process steps were basically the same, the only simplification was that instead of a concept comparison table, a conceptual map was drawn on a whiteboard (see Figure 5) and the concepts resulted from each participant were discussed.
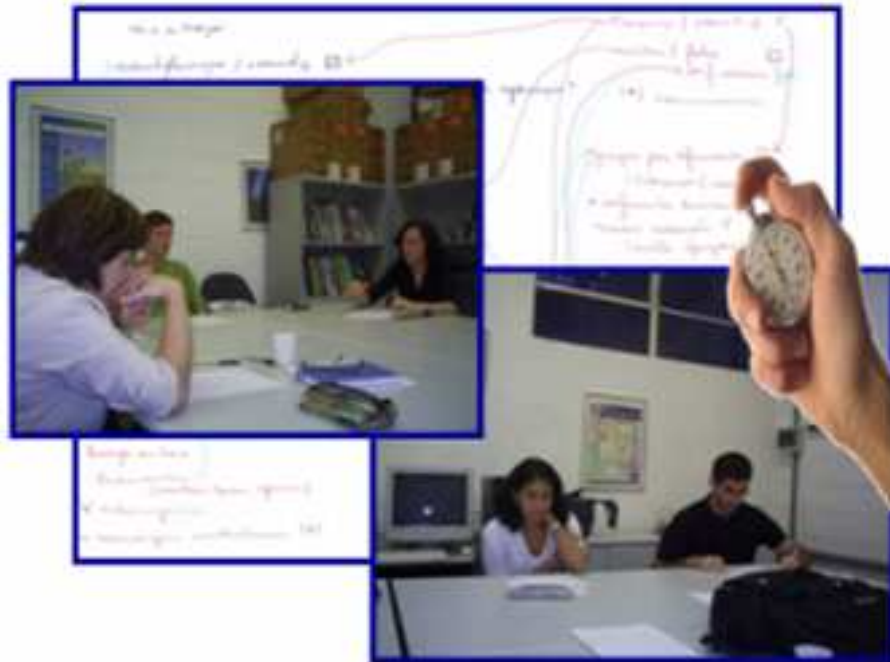
Figure 4: BrainWriting in action

The resulting concepts were divided into five groups: Group **A)** Identity and identification, tailorability, privacy, reputation and coordination model; Group **B)** Different media, various needs of the users, diverse interest groups; Group **C)** Presence; means of representation and expression (e.g. pictures, avatar, videos); Group **D)** Features: calendar, instant messenger, sharable areas, collaborative edition, forums, idea links, groups, visibility, people; and Group **E)** Physical (real) center (TeleCenter).

Figure 5: Resulting Concepts

4.3   BrainDrawing in e-Cidadania

The same group that participated in the BrainWriting activity also collaborated during BrainDrawing. They followed the steps exactly as described in section 4.1, circulating the sheet of paper with the drawings among the participants. The short time allowed for them to draw, guaranteed that no one would be able to finish a complete idea in their sketches, so that the final artifacts were all composed of a mixture of ideas. To illustrate, Figure 6 shows two of the resulting drawings.

5   Preliminary Results

The participatory techniques described in Section 4.1 resulted in concepts and drawings that express a sum of different views about the system (user's, designer's and developer's). To reach the first design proposal for a prototype, the design team worked with these results and proposed some UI sketches. The decision making was recorded in a Design Rationale document. Also, an initial list of requirements was defined. Sections 5.1 show how the concepts (BrainWriting) and drawings (BrainDrawing) were analyzed. Section 5.2 presents a materialization of the ideias from previously discussed. Section 5.3 points out the initial list of functional and non-functional requirements. Section 5.4 discusses some design decisions.
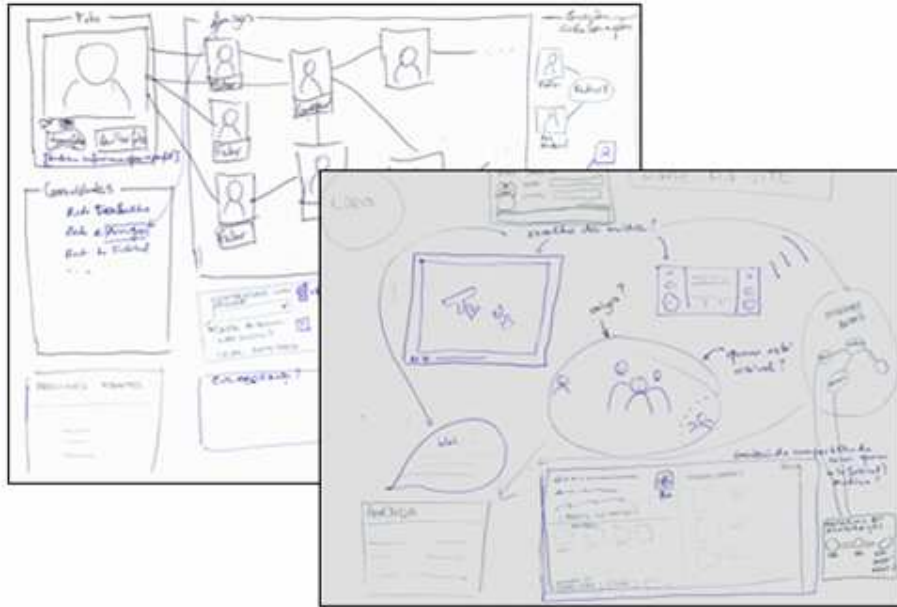
Figure 6: BrainDrawing examples

5.1 Getting data from BrainWriting and BrainDrawing Analysis

As presented in Section 4.1, using the BrainWriting technique, we obtained a list of concepts. These concepts were classified considering their importance (reflected by the number of times that each concept appeared) and we obtained 5 groups, being A the group that gather the most important concepts. The design team worked with these concepts to reflect them in a design proposal. Table 1 represents the main ideas of the design team to work with the concepts in group A.

Other design ideas were discussed for the concepts presented in Table 1 and also for the concepts classified in the other groups (B to D). The first design ideas presented in Table 1 were combined to the ideas that came from the BrainDrawing Analysis (described in the next section). These ideas started the process of drawing a first design proposal for the prototype.

As a result of the BrainDrawing activity, many different design proposals were created. Even though they were all designed by the same group of people, each one was unique, as each had a different start. Some items appeared in many of the resultant drawings. These items - together with their description - are shown in Table 2.

For the composition of the first prototype, all elements mentioned in Table 2 were discussed and taken into consideration. A group smaller than the one that took part in the BrainDrawing and BrainWriting processes formed and reached preliminary design decisions, which are explained and illustrated in the next sections.

Table 1: Design ideas for the most important concepts

Concepts	Design ideas
identity/identification	Offer to the user the opportunity to make a photo or an avatar available. Offer the possibility to record an auto-presentation in different media as sound and video. Display a contact's nick name according to the user's preferences and allow change them in the interface.
customization/flexibility	Flexibility should be addressed in two levels: flexibility for the coordinator-user (the person who creates and makes tools available in the communities) and for the participant-user (the person who interacts with the tools in a community) Possible customizations: **Presentation**: font (type and size), color, position (closing or opening interaction areas, moving interface elements) **Content**: access by different media (text, sound, video) **Device**: desktop and cell phones (some functionalities)
privacy	It should be possible for users to select their "online status". A user can select which of the other users can have access to the content she posted (including personal data). Users may want to participate in communities without the knowledge of other users. Users can accept or not being related by friend (or other) relationship.
reputation	Users reputation could be evaluated by participation or even by content merit (how others judge her or his posts)
coordination model	The system should consider different types of users with different permissions. A contract of use should be established between the eCidadania researchers and the community and also between the community (by its coordinators/responsible for the software instance) and the end-users.

Table 2: Common elements among the BrainDrawing outcomes

| Items	Description and comments
logo and website name	An important aspect of the concept of identity/identification is the display of the websites name. It seemed to be a consensus that the name should appear in the top of a page and its logo on the top left corner. The identifying symbol of a logotype represents the visual identity of the community.
profile	Still regarding the identity/identification subject, the profile exhibits the information about each member of the network. Since common qualities, interests and characteristics are what connect people, it is important to have this information explicitly in the site.
contacts network	Since one of the main purposes of a social network is to express the relationships and connections among people, it is natural to have a contacts network. In the resulting drawings, different forms of representation were suggested, being the pictorial ones themostlyused.
communities	To provide forms of managing and displaying communities was another preoccupation shared by many of the participants during the BrainDrawing process. The spontaneous way in which communities are formed and maintained in real life should be reflected in its virtual version. The drawings show concern about having links and different types of media involved.
calendar/shared schedule/news (see Figure 7)	The collaborative nature of communities and its cooperatives ask for tools that allow them to share interests and to create together. Among others, one element that would be useful to these groups is a calendar that all members could edit and link, making important events known to others.
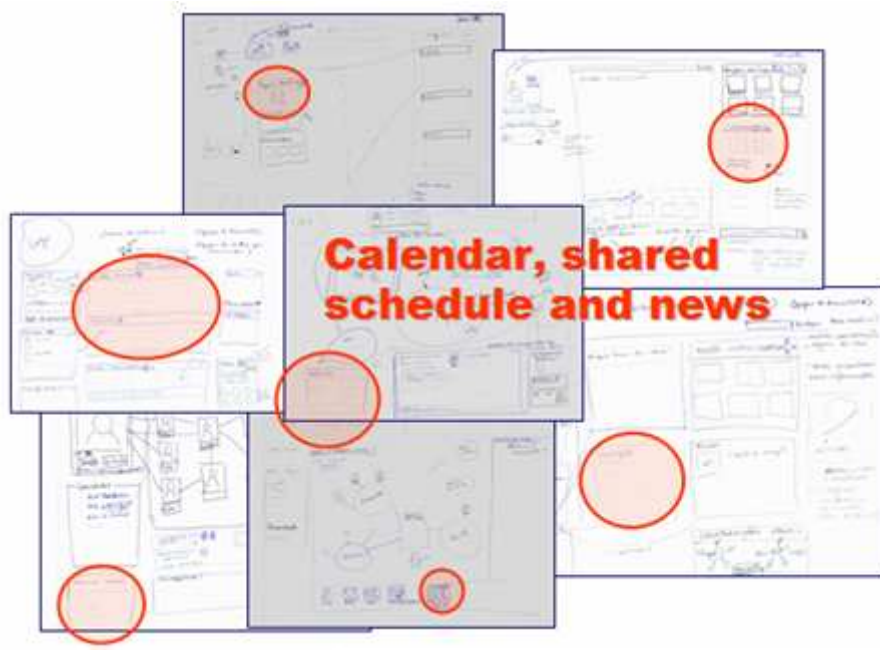
Figure 7: Example of common elements across BrainDrawing results

5.2 Materializing Design Ideas

To facilitate interaction through the system, we defined interaction areas that should be present in every web page (see Figure 8) of the prototype. By defining those areas we expect that users be able to operate through different web pages and functionalities. Moreover, we expect to create conditions for them to add completely new features with a low learning curve and without the help of others.

The header contains the identification of the website (i.e., logo, name) and other resources that contribute to the interaction, such as:

- **Skip Links** provide a fast shortcut to other areas of a web page[9]. They are usually the first elements in a web page. Skip links are especially useful to those who use keyboard to navigate such as people visually impaired.

- **Accessibility Bar** contains some resources to increase the accessibility of web pages. Examples of common resources are font size and high contrast controllers.

Breadcrumbs are located just below the header area. We choose to provide breadcrumbs due a number of benefits of it, although we still need to verify the reaction to it from our target audience. Nielsen [31] defines breadcrumbs as: "Breadcrumbs use a single line of text to show a page's location in the site hierarchy. While secondary, this navigation technique is

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[9]WebAIM. Skip Navigation Links. Available at: `http://www.webaim.org/techniques/skipnav/`
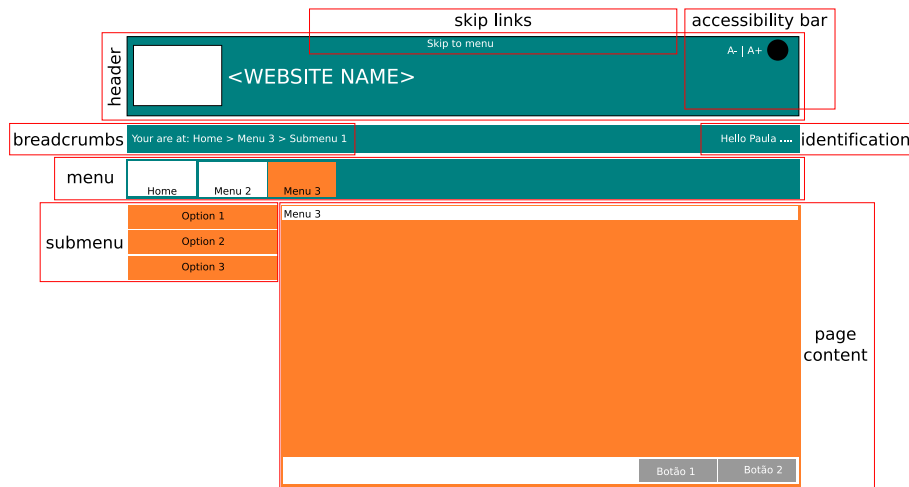
Figure 8: Design proposal interaction areas

increasingly beneficial to users". Nielsen [31] points some of the reasons why breadcrumbs should be adopted:

- Breadcrumbs show people their **current location** relative to higher-level concepts, helping them understand where they are in relation to the rest of the site;

- Breadcrumbs afford **one-click access** to higher site levels and thus rescue users who parachute into very specific but inappropriate destinations through search or deep links;

- Breadcrumbs **never cause problems in user testing**: people might overlook this small design element, but they never misinterpret breadcrumb trails or have trouble operating them;

- Breadcrumbs **take up very little space** on the page.

On the right side of the breadcrumbs is presented the user identification, basically we show the user name when he/she is logged in; this way the user can be aware about the authentication state and avoid to use accounts of other users.

The menu area presents the main functions of a social network. When an option in the menu is selected, three modifications take place: the selected menu item is highlighted, the page content area associated to the menu item is displayed and the submenu shows the additional options to the selected menu option. The submenu area contains the more specific functions regarding an option of the menu area. For instance, a menu named "community"could have the submenu options: "my communities", "new community", "join community". Page Content is a dynamic area to display the content related to menu and submenu options select.

Based on the previously presented concepts and interaction areas we designed a first approximation to support a social network in the scope of the e-Cidadania Project. The

prototype designed involved the basic resources we believe that should be present in a website to support a social network such as: user profile and communities management. Figure 9 is an example of the sketches. To a complete analysis of the prototype sketches see Appendix A.
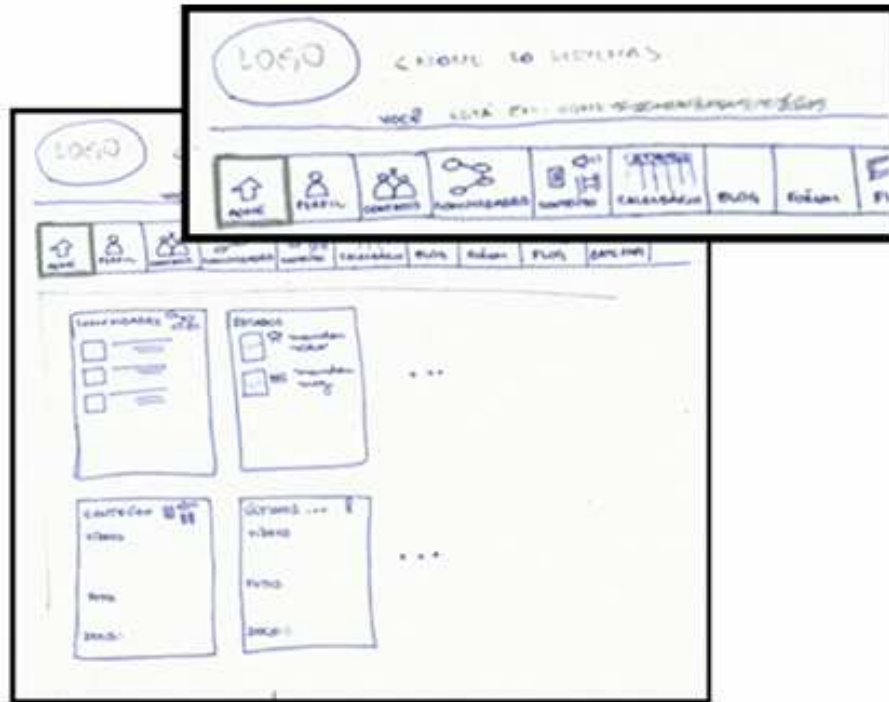

Figure 9: HomePage General view and tools bar in detail

Home page

The home page (see Appendix A.1) contains a brief presentation of the website which is available in different media (e.g., video, text, audio, sign language). Also in the home page, there is a field set to users proceed the login or join to the website.

User registration

When a user decides to register in the website, he/she is directed to the user registration page (see Appendix A.2) and prompted to fill in a small set of data (i.e., name, login name, password). Before confirming the registration he/she is supposed to read the website's term of use.

This page contains some questions that must be evaluated by literature review and by empiric tests with user representatives. The first question is about the best identification for users (e.g., nickname, first and last name, complete name). The second is about the method to authenticate the user (e.g., textual password, icons, pre-defined answers).

User's home page

After the user logged in, the user's home page (see Appendix A.3) is presented. This page has the main menu and the submenu areas, like all the other pages that are accessible

only after the login. To provide a fast summary of the news in the social network that the user is inserted, a set of boxes separated by theme is provided. For example, about communities we present some statistics (e.g., number of members, number of activities in the week) and functions (e.g., view all communities, search for communities). Users can decide what set of boxes will be visible in his/her home page and which information will be displayed in each box.

User profile

One of the most important features in a social network is the user profile, since oftentimes people only know each other through the social network application. To support the members diversity, we propose an "User profile" page (see Appendix A.4) where the profile content can be posted in more than one media (e.g., text, video, audio).

Adding multimedia content

When a user selects to input multimedia content to his/her profile, he/she is directed to a specific page (see Appendix A.5) where there are two options to do that. The first option is to inform a previously recorded media file and the second one is to record the media using the application.

My communities

To express special interest about some subject, users can create communities (see Figure 10). In the "My communities"page (see Appendix A.6) users have an overview of all the communities they are members. In addition, users can choose which information will be displayed about their communities.
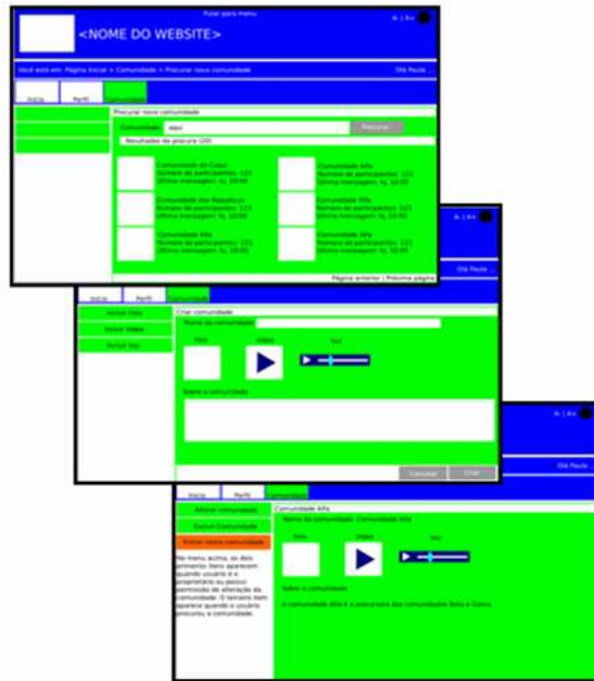
Figure 10: Community sketches

Searching for communities

Before creating a new community users are supposed to search for the available communities regarding their subjects. In the "new community"page (see Appendix A.7) they can fill in a field informing the community they are searching for and navigate through the communities that match the search.

Create community

When no previously created communities match the users interests, they can create new communities. The "community"page (see Appendix A.8) offers multimedia content input, as presented in the "User profile"page.

View community

When no previously created communities match the users interests, they can create new communities. The "Create community"page (see Appendix A.8) offers multimedia content input, as presented in the "User profile"page.

5.3   Requirements

In this section we present a preliminary list of functional and non-functional requirements we already envisage. These requirements emerged during the BrainWriting and BrainDrawing. During the course of the project and especially after the first participatory activities this list will probably be expanded. On the other hand, some of the requirements may be dropped.

Communities

- create, edit (name, description, image, video, sound message, define tools),

- delete, search

- list "my communities"

Contacts

- add, remove, search, list "my contacts"

- Profile:

- edit profile (textual data, video, audio)

Home/Personal page

- list messages left by other users

- customize list of visible tools

My content

- add, edit, share and remove documents, videos, images, audios

Calendar, Agenda

- create, edit and delete events in personal, group or community calendar

Latest news

- post, search

Tool to express and link ideas

- functionality to be defined

Tool for on-line interaction with friends

- functionality to be defined

Roles and security

- requirements to be defined

Customizability

- position/visibility of areas of interaction and other elements

Accessibility

- navigation via keyboard,

- change font, icon and image sizes,

- change contrast and colors

Usability

- prioritize graphical representation,

- maintain navigation consistency,

- offer contextual information

Privacy

- define levels of privacy, e.g. visibility of on-line status, visibility of personal information

Identification

- add, edit, delete foto or avatar, video, audio or text message

Reputation

- evaluate other users or content published by other users

Coordination model and Authorship

- requirements to be defined

5.4   Design Rationale

The design rationale is an instrument to record design decisions during the whole process of design. It documents the reasoning, motivations, discussions, debates, negotiations and compromises that determine the design of a computer system. Apart from keeping track of design decisions and thus creating a memory of the design process, the design rationale also serves as a reference in order to keep design consistent throughout the project life cycle. We chose a gIBIS-like notation as formalism to create the design rationale (graphical Issue Based Information System[9] using the tool "Compendium"[20]. This tool supports the elements presented in Figure 11.
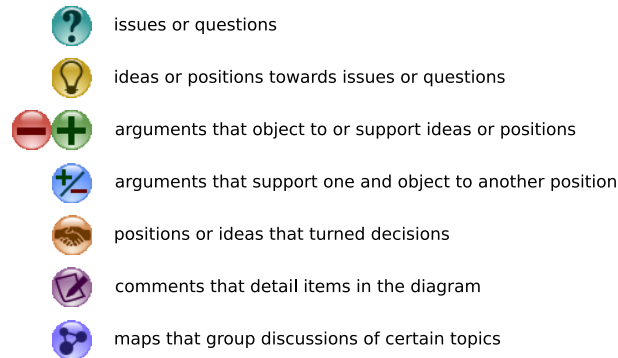
Figure 11: Elements of the Design Rationale Tool

In most cases, the design rationale documents decisions of a concrete design, however in the context of this project, we will use this instrument to also document discussions about more abstract matters of design like requirements. Figure 12 illustrates a sample issue of the design rationale. Appendix B contains the issues we identified so far grouped into the categories areas of interaction, technology related aspects and requirements. Since the design rationale is work in progress, the current document is by far not complete, neither regarding issues, nor ideas or arguments. Furthermore we are aware of the constraints of a Design Rationale document, for example the difficulty to communicate design decisions to third parties who are not directly involved in the project [19]. This is especially true for a document that depicts early stages of a discussion; however we believe that the more the Design Rationale will be detailed and the more design artifacts will be created, the better will it serve to communicate the design decisions.
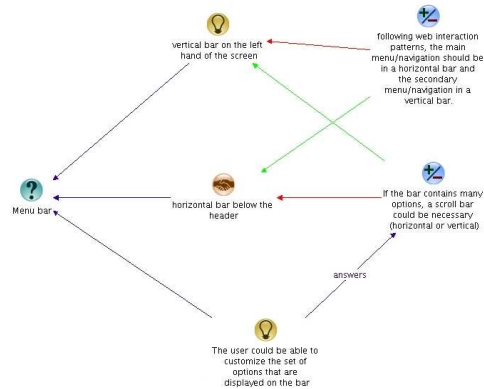
Figure 12: Sample design rationale issue

6   Conclusions

The statistics show that we face a scenario in Brazil that is characterized by a diversity of competencies within the population for which neither design experiences nor literature results exist to get inspiration from. In this context, Computer Science should search for methods and system designs that provide access and make sense to the users' community, thus supporting the formation of a digital culture that respects the diversity in our society.

The e-cidadania Project strives to contribute to this proposal of new methods that could deal with the difficulties of designing for diversity and collaboration. Also, it is expected to develop a "virtual space of communication"that could support an inclusive social network.

In order to explore a first design proposal for this "virtual communication space", we applied two participatory techniques, BrainWriting and BrainDrawing, to reach design concepts and interface drawings. From these techniques outcomes, we could get to the initial sketches and also some requirements. This technical report presented our exploratory process since the study of other systems to support networks, passing through the participatory techniques applications and getting to the first interface proposals.

The use of participatory techniques offered the possibility of knowing the different "views"(from community, designers and developers) about what systems to support inclusive social networks should have. And more than that, the techniques offer the possibility of putting these views together.

The next step in this research is to further elaborate this first approach to the design. Participatory workshops in the target community will be conducted, when it will be possible to really situate design in the challenging social context we have .

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CenPRA and IC Unicamp for insightful discussion.

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Apendix A - Prototype Sketches

A.1 Home Page
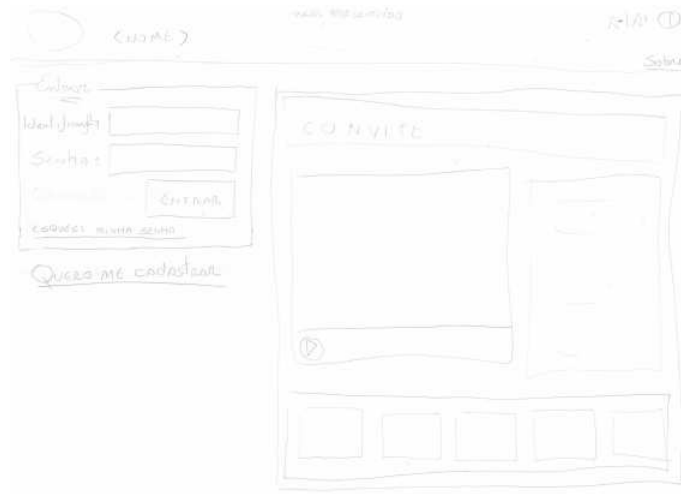
Figure 13: Sketch of the Home Page

A.2 User registration
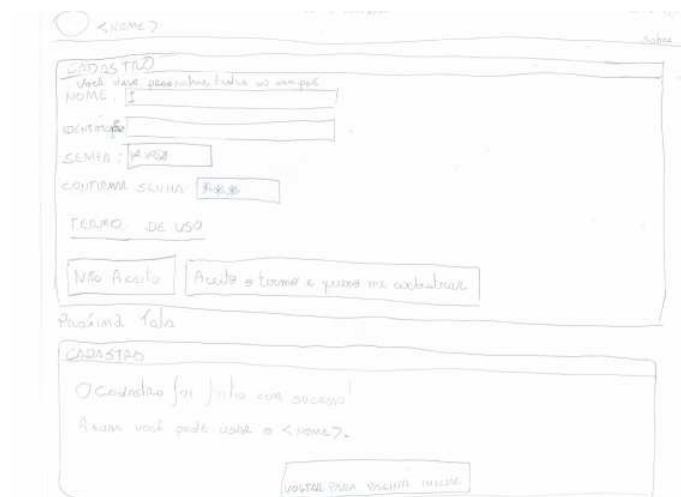
Figure 14: Sketch of the User Registration

A.3 User home page
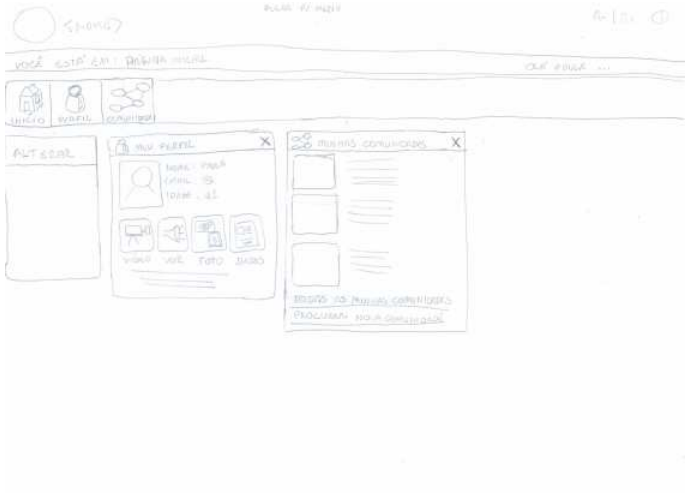
Figure 15: Sketch of the Users' Home Page

A.4 User profile
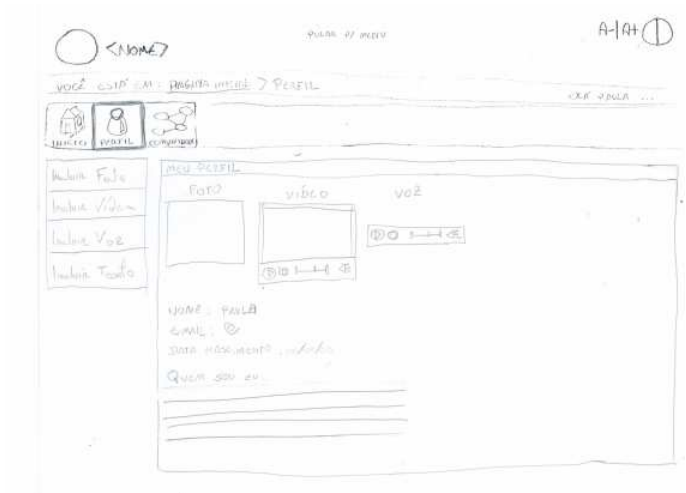
Figure 16: Sketch of the Users' Profile

A.5 Adding multimedia content
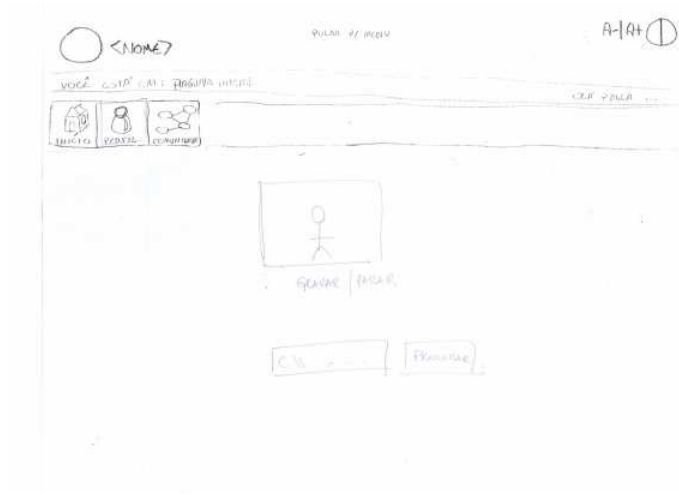
Figure 17: Sketch of the Adding multimedia content

A.6 My communities
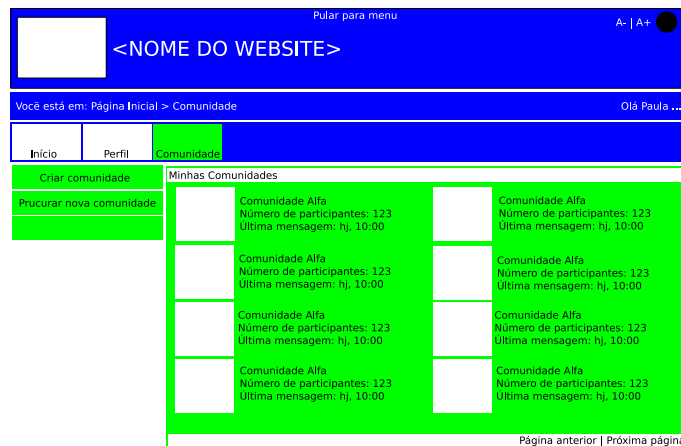
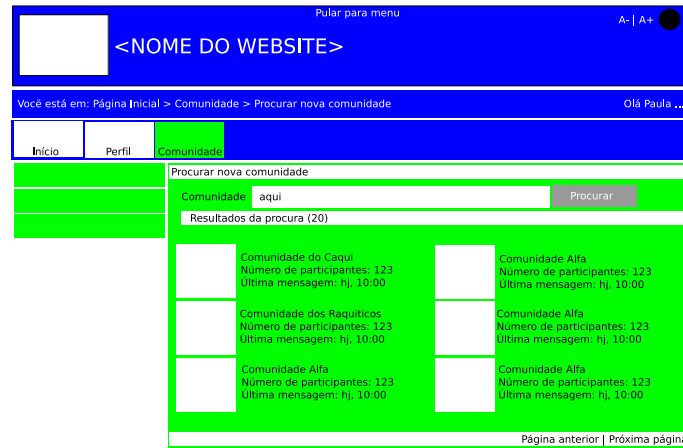Figure 18: Sketch of the My Communities

A.7 Searching for communities

Figure 19: Sketch of the Searching for communities

A.8 Create community

Figure 20: Sketch of the Create Communities

A.9 View community

Figure 21: Sketch of the View community

Apendix B - Design Rationale

B.1 Areas of Interaction
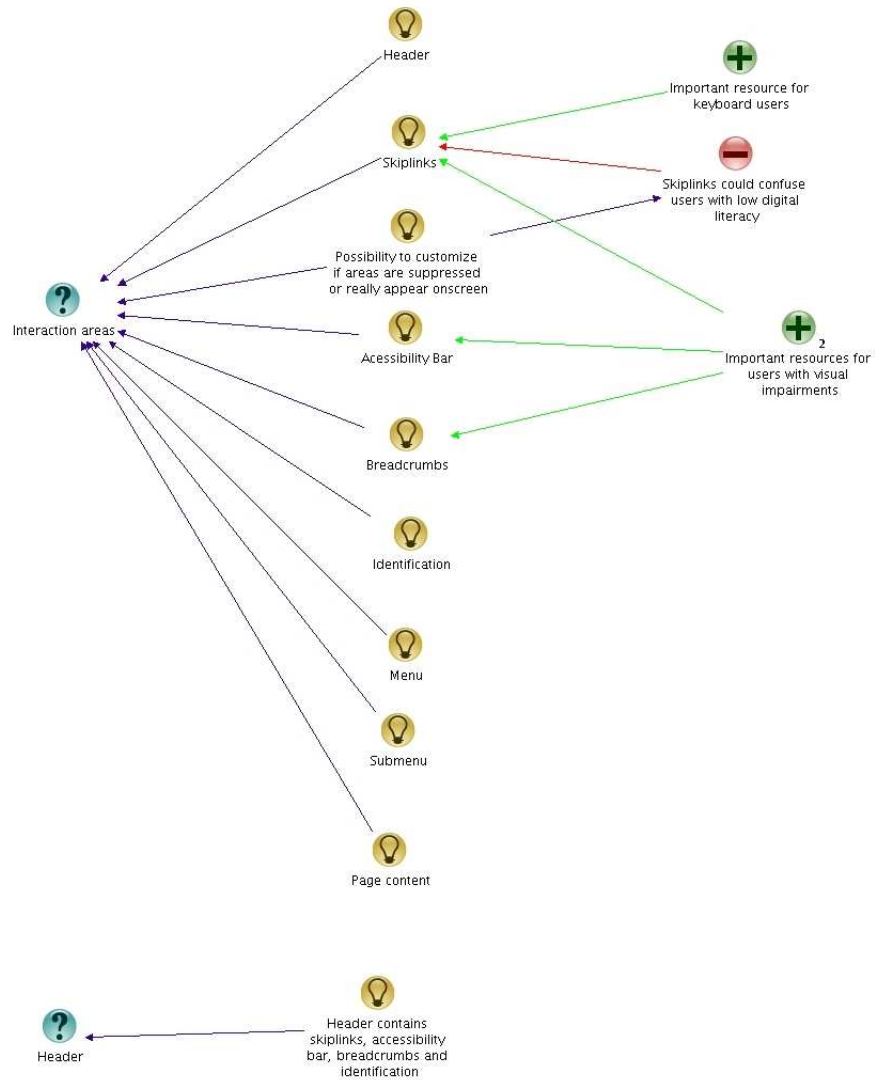
Figure 22: Design Rationale of Interaction Areas (Part 1)
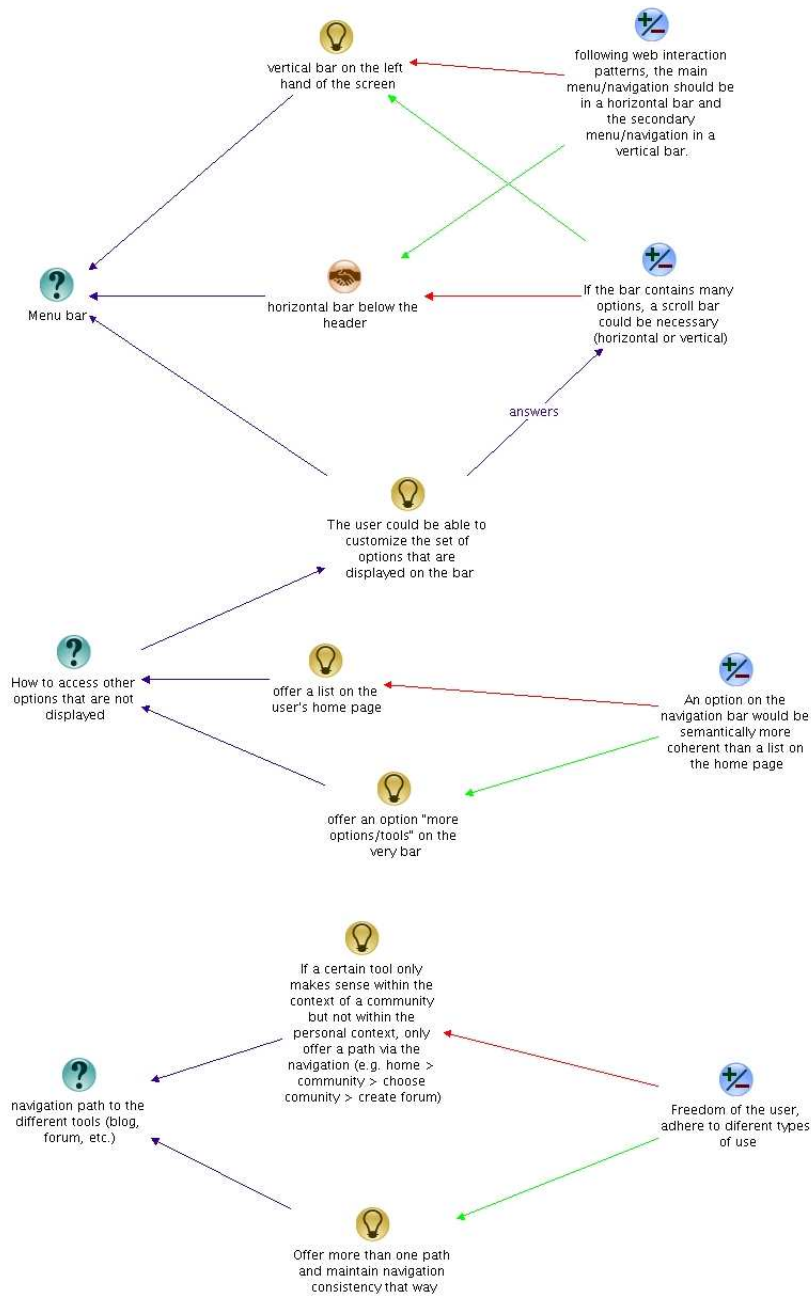
Figure 23: Design Rationale of Interaction Areas (Part 2)

B.2 Technology Related Aspects
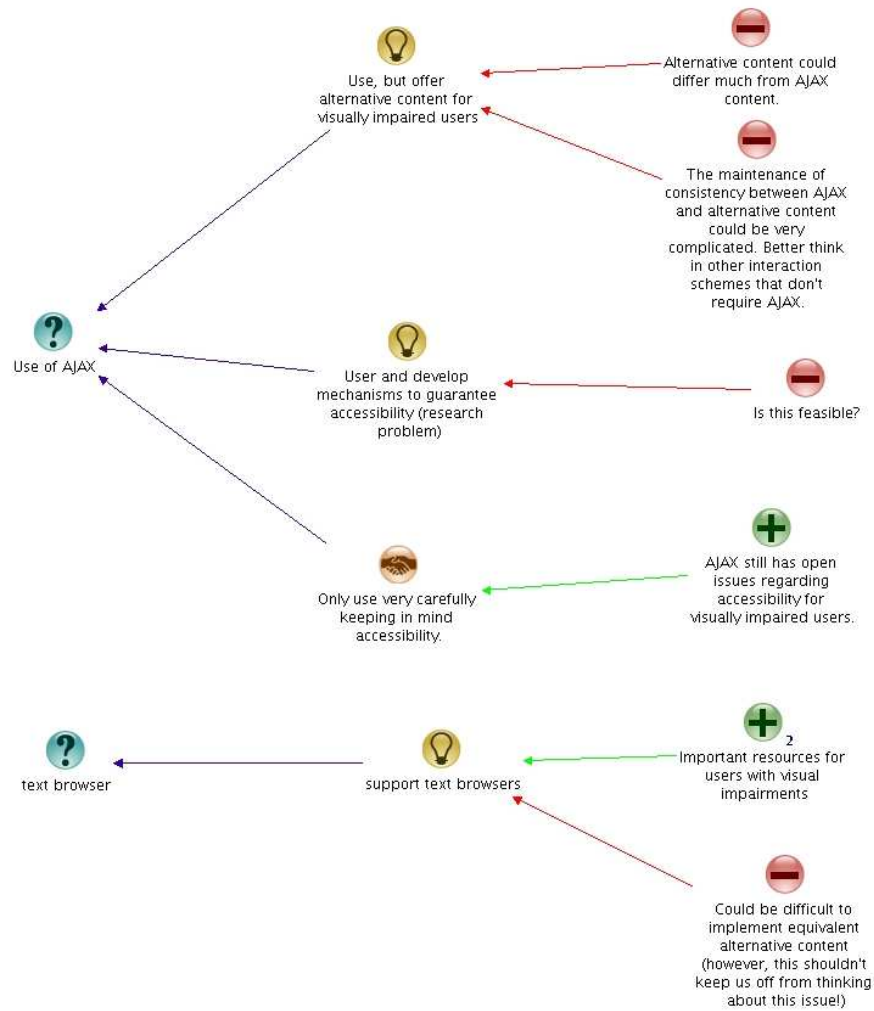
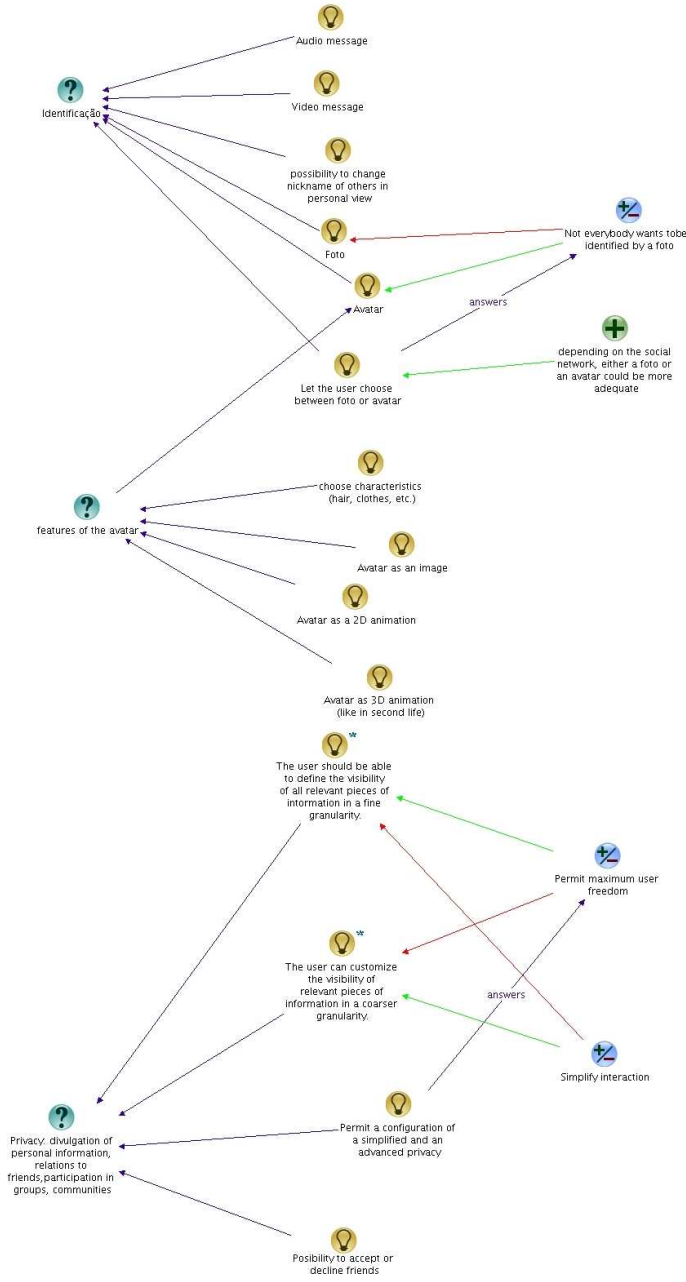Figure 24: Design Rationale of Technology Related Aspects

B.3 Requirements

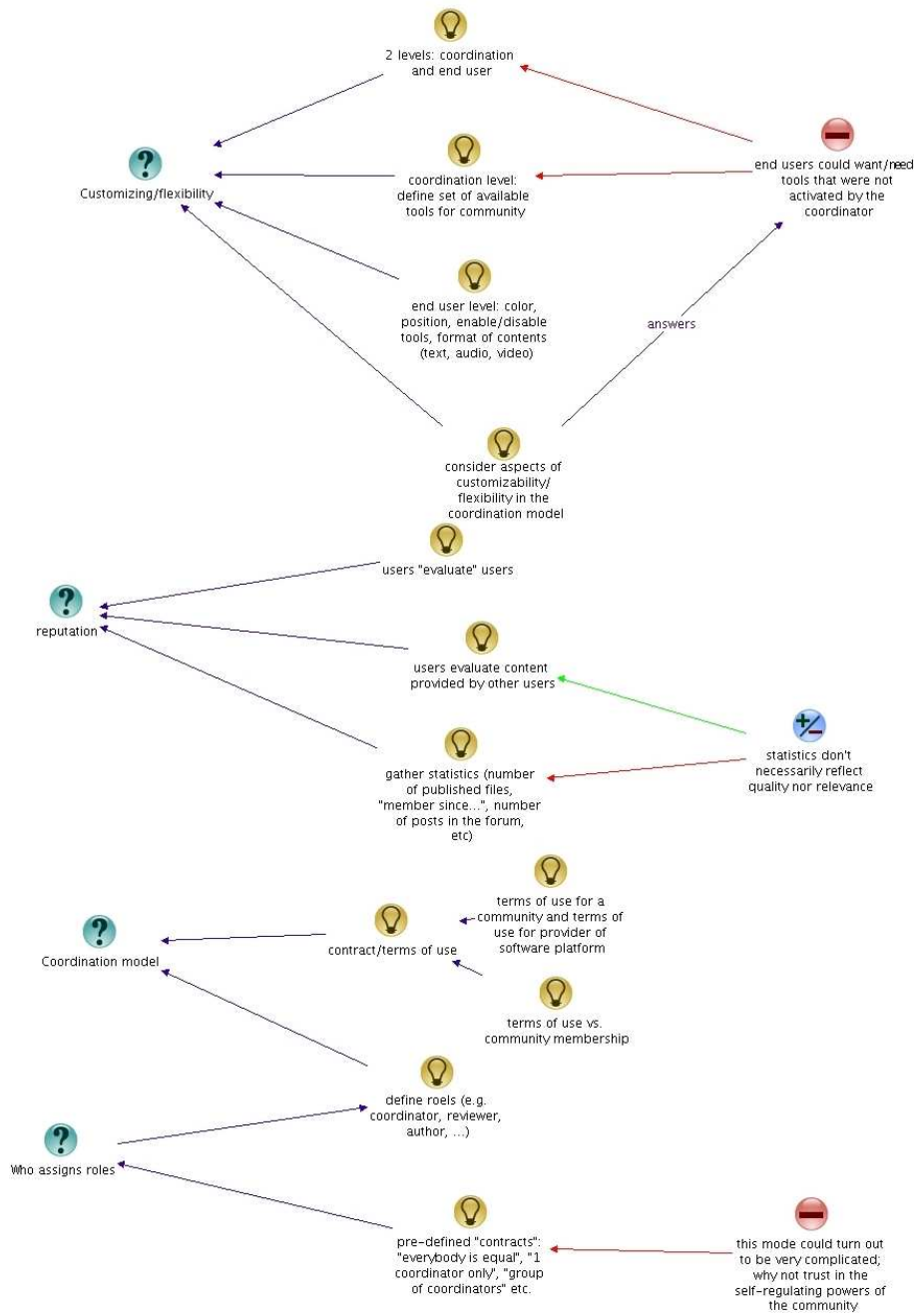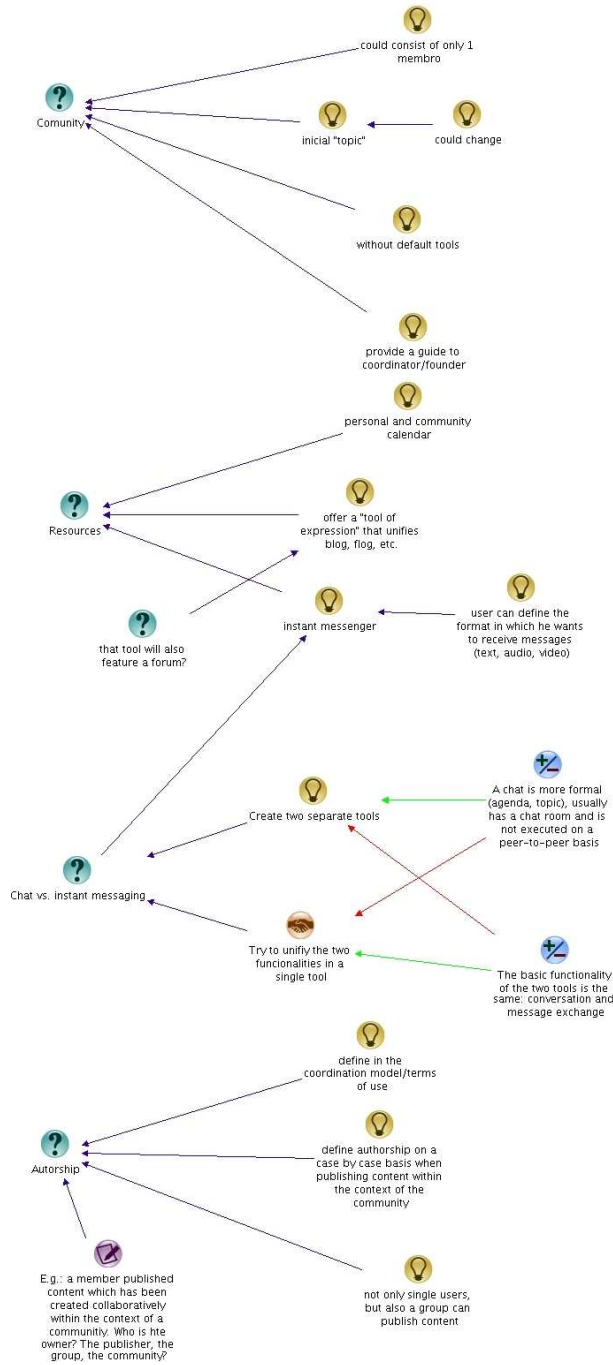Figure 25: Design Rationale of Requirements (Part1)

Figure 26: Design Rationale of Requirements (Part2)

Figure 27: Design Rationale of Requirements (Part3)