Aide's Aide: Assistance to Home Health Aides

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Contents

1   Summary

Aide's Aide is a knowledge-sharing website intended for Russian speaking home health aides living and working around the Northeast locality of Philadelphia. The goal of *Aide's Aide* system is to help aides better and more efficiently serve their patients as well as help each other by sharing resources and information in a secure environment. The user community is a community of practice that lives across official organizational boundaries, in an active stage of development (i.e. aides engage in joint activities, share information, develop relationships), but visible only informally to those who are informed (Wenger, 1998).

In socioeconomic terms this is a low income community and even though most members are highly educated, most of them are in their 50s, know little English, and their knowledge and skills are outdated and/or not relevant to American culture (e.g. it is hard to be a Soviet-trained accountant or "economic engineer" in a capitalist society). To overcome these disadvantages aides work extended hours, often without weekends or vacations. They are in great need of a tool that would organize their work a little better and save them time and resources.

The proposed *Aide's Aide* website will provide instruments that would allow aides to share news, generate weekly paperwork, organize carpools for rides to the offices, and accumulate knowledge about different aspects of their lives and work. The site needs to be secure in order to protect sensitive personal information such as patients' medical information, aides' phones, addresses etc.

2   Requirements

This section defines functionality that *Aide's Aide* website must provide in order to satisfy the users' goals and expectations. The functional requirements defined in this section (see Table 1) were generated from interviews with users and refined by the system's goals. The functional requirements presentation format was adopted from Lewis and Phillips (1988).

3   Design Space

During the design phase I had to make some decisions (not all of them finalized yet) on the following issues:

- *Privacy vs. easy access of information.* Part of the information on the website must be protected (e.g. clients' addresses, phone numbers, etc.). At this stage it seems impossible to predict where sensitive information may turn up; thus I have to decide whether to protect all the information on the website, i.e. make the *Aide's Aide* website publicly inaccessible, or protect only part of the website where appearance of sensitive information is more probable.

Table 1: *Aide's Aide* System Requirements

#	OBJECTIVE	SYSTEM REQUIREMENTS
1.	User should feel safe using and leaving any personal information on *Aide's Aide* website.	System shall provide secure login and registration mechanism as well as store user login information in database. System shall include validation methods to facilitate security and ensure that only members of aide community are allowed to register.
2.	User should be able to look for carpool or offer carpool	System shall allow user to read, add, modify, and delete carpool records. System shall have an automatic mechanism for deleting outdated records.
3.	User should be able to effectively complete weekly paperwork online.	System shall allow user to open or download, fill out, and print or fax (where permitted) documents related to his or her job.
4.	User should be able to participate in online news sharing.	System shall allow user to read news entries of other users and shall include a free form text interface that would allow user add, modify, and delete unstructured text.
5.	Advanced users should be able to participate in news sharing via cell phone.	System shall provide a mobile version of the website and allow uploading pictures and text messages from a cell phone.
6.	User should be able to find and/or share information on how to fill out various applications.	System shall allow user to upload a document in major text and picture formats and add any additional instructions to that document. System shall have a mechanism for downloading and viewing documents.
7.	User should be able to find and contribute information about government programs, give and receive advice, ask for and provide help with English translations.	System shall allow user to read, add, modify and delete unstructured text on appropriate topic.
8.	Advanced users should be able to create interface for new topics.	System shall allow user to start new wiki style pages under the *Knowledge TAP* section. See Figure 2.

- *Rich functionality vs. usability.* Here I mean usability literally. My users might not be able to use the website at all if it is overflowing with controls. On the one hand, so much can be done in terms of the user controls, but on the other hand, too much functionality might discourage novice computer users.

- *Create software from scratch vs. use pre-existing open source wikis or groupware.* I have not settled on this issue yet. On the one hand, use of groupware would save some time on back-end development but on the other hand it may be too inflexible in terms of customization.

In this project, the hardest requirements to support are those that require more steps to complete the task. This is because I have to translate English language controls (e.g. submit button) and general instructions into Russian. Stander (1998) asserts that merely translating user interface controls from English into another language does not always work effectively for users of different culture. I am familiar with the English name conventions but not with the Russian ones because I became a computer literate person here in America (as well as my users, so I can relate to them in a way). Naming conventions that Russian websites use sounded foreign and unnatural to me at first so I spent a lot of time figuring out instructions and control names. However, preliminary test with users showed that I need to make many improvements here. I may have to consider using bilingual instructions to avoid ambiguity and at the same time help my users familiarize themselves with the English computer commands.

Probably the hardest requirement to support is "Fill out and print weekly paperwork" since I have not figured out yet how to make this task as easy for a user to do as others. I have to preserve the specific format of the document, so I settled on .pdf format, but my users may have difficult time understanding how to download and print it.

4   The Design

This section will describe the design concept of the *Aide's Aide* including motivations that lead to it, structural elements of the *Aide's Aide* website, pictures of prototypes, use cases and usage scenarios.

4.1   Design Concept

The design concept of the *Aide's Aide* website emerged from the goal to provide useful tools for users that are unfamiliar or barely familiar with computer technology. During the first usability trial session, with paper prototypes, users showed a lot of enthusiasm and willingness to learn new technology but they quickly became confused when they were asked to perform a task that seemed unnecessary or unfamiliar to them. For example, users could not understand that they should register to log in for the first time and why they needed to answer a security question for that. Thus, after that session, I had to scale down my expectations of user experience and rethink the approach to *Aide's Aide*'s design.

As the base for the design of *Aide's Aide*, I am adopting the ideas of multi-layering of user interface and functionality. Dickinson et al. (2007) shows that for novice and older users "the radically simple" system is much more comfortable and "provides more positive experience" initially. Introduction of layering (e.g. progressively added functionality) helps users learn new technology at comfortable speed and progress according to their needs (Shneiderman, 2003). Unfortunately, the time constraints for the project do not allow for the creation of a fully functional back-end for a multi-layered program that would support all ranges of user expertise. Thus, I strive to create a multi-layered user interface for the whole system but only the basic first layer will be fully functional (at the back-end).

The Figure 1 shows the example of the multi-layered approach to any free form text entry at the *Aide's Aide* website.
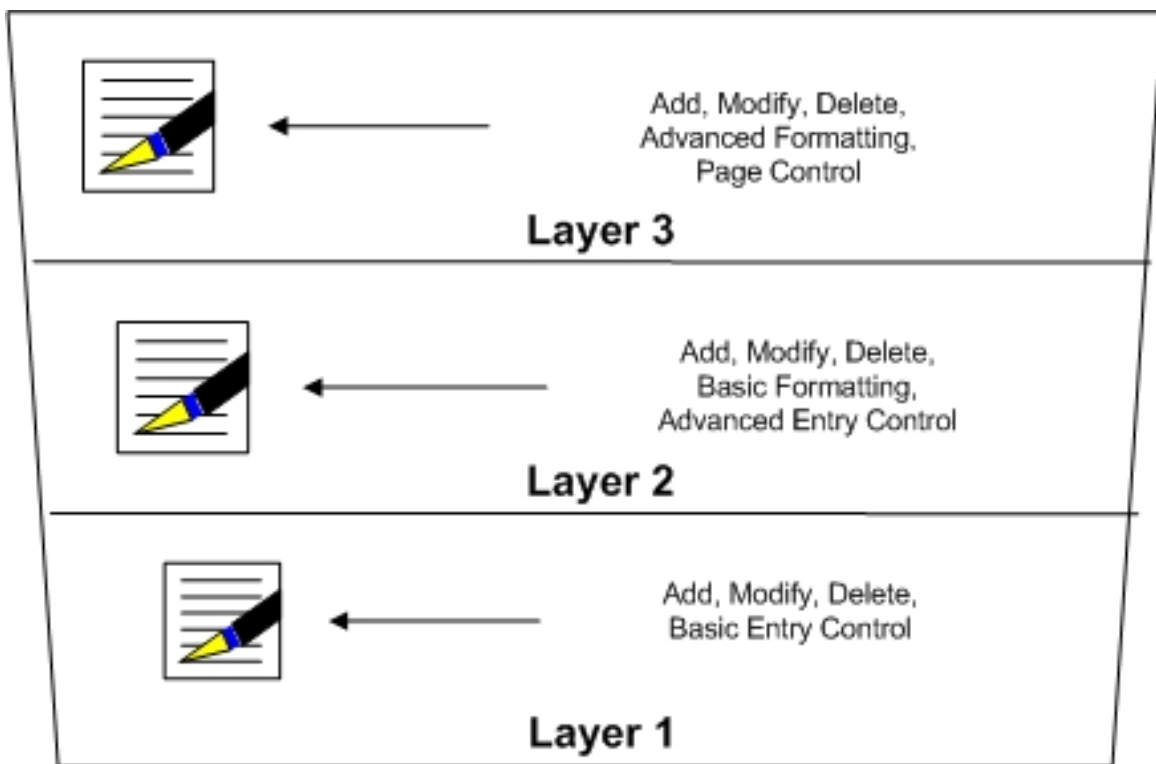

Figure 1: Multi-layered Approach For Text Entries

Since most of the user population are novice computer users, all pages on the website will open with a very simple design (both interface and functional), and as users' needs and skills progress they should be able to add a new layer of functionality. The overall structure of the website (see Figure 2) will remain the same for all types of users, and the layering will occur at the page level. In other words, every page on the website would expand its functionality and elaborate its interface with progression from the first (i.e. basic) layer to the next. This approach would take substantial cognitive load off users as they learn the system, while keeping a very predictable environment (e.g. navigation and page layout would

stay the same) as they go to the next layer (Dickinson et al., 2007). That should lower the risk of a user becoming discouraged and quitting using the system. As part of this approach, users who become very familiar with the site's layers will be able to set preferences for each page functionality at his or her personal profile page.

The *Aide's Aide* system is not intended to receive content from third parties and World Wide Web (e.g. rss feeds), so there is not going to be content layering.

It is also worth noting that navigation between the layers and each layer's composition might create additional difficulty for users, i.e. it represents one more form of navigation (Shneiderman, 2003). Unfortunately, at the design stage it is hard to predict whether this layering idea will work or not and, if it does, what the composition of layers and the type of navigation between them will be. Thus, I want to reserve the final decisions until I test this design on users.

4.2 Tradeoff Decisions

The website design emphasizes simplicity, which is achieved at the expense of flexibility and availability of the controls, at least at the lower levels the of multi-layered design. This means that at the lowest layer a user would not be able to do anything beyond reading and simple text entering. This decision is based on my personal observations on how my users use computer programs and cell phones. I observed them performing simple tasks such as scrolling, menu selection, etc. Some of my users may be compared to beginning student drivers: they know in theory what needs to be done to perform certain tasks but their motor skills matching these particular tasks are not developed enough to carry them without a heavy cognitive load.

The decision on simplicity influenced the decision on security. I believe that it would be much easier for aides to not have any hassle with secure logins. Still, I feel that the issue of information protection supersedes any usability concerns. As a result, there is going to be one secure point of entry on the website (i.e. user log-on). This structure ideally suits both maximal security and optimal simplicity. I talked to users and they understand the necessity of secure login to protect their personal information. This design also has a convenient logical explanation for aides. As one of them told me, "It is easy, I give my name and password and then enter into our space."

For the back-end of my system I would love to use pre-existing (open source) groupware, but the users' abilities in this case should take precedence over developers' capabilities or habits; otherwise, this system would be of no use. On the other hand, I do not have time and probably skills to reinvent the wheel and create all the back end functionality from scratch. Therefore, I have decided to concentrate my efforts on user interface design using open source groupware, then test it with users and, if it is successful, continue in this direction. If not, I would scale back on the functional part and present mostly an interface part.

4.3 Software

At this point of time I am planning to use Microsoft ASP.NET software platform for developing *Aide's Aide* website with Microsoft Expression Design and Adobe Fireworks as the design tools. My database choice is MS SQL. However, I may use some pre-existing packages as well. I am still researching the possibility of using TikiWiki or Joomla. Both are highly customizable and have multilingual support.

4.4 Structure, Appearance and Navigation

The overall structure of the *Aide's Aide* website is simple (see Figure 2). After a user logs on, he or she is brought to the homepage where short term news and information are displayed. From the homepage, at the first (lowest) layer, the user can navigate to any page available at the site except user profile page which becomes available only from the second layer. The following list enumerates the website's pages and gives a short description of their functions:

Login Page. The gateway to the website. Users must login to enter. First-time users must register by answering a security question.

News Page. The main (home) page where users are taken after they log on to the website. Provides short term news and information.

Carpool Page. Facilitates carpooling negotiations.

Applications Help Page. A how-to knowledge base for filling out various applications.

Knowledge TAP Page. Long term news and information, including: **T**ranslations from English, useful **A**dvice, and government **P**rograms.

Each page at the website has similar and consistent design. The color coding is essential to that task since it will convey consistency, similarity and at the same time differentiate between sections. In other words, to be helpful in creating effective mental model of the website, the colors need to be in one-to-one correspondence with the categories of the website (Tominski et al., 2008).

The *Aide's Aide* website controls are going to be oversized with large font sizes. This decision is based on the fact that many aides are in their 50s, so it is safe to assume that they start experiencing age related changes in vision and/or manual dexterity (Dickinson et al., 2007). Thus, I am going to strive to create a comfortable interface design for older users and I hope it would extrapolate its comfort level to others.

Despite the fact that controls and fonts are going to be oversized I am planning on producing a nice looking website. Aesthetic experience is a very important aspect of the website acceptance. My main effort in this area would be an attempt to relate the interface design to aides' cultural background and the community spirit and make it visually appealing at the same time. For example, I am going to utilize pictures (sparingly) of familiar and culturally significant places in Northeast Philadelphia.

4.4.1 Navigation

In this section I define the concepts of the *Aide's Aide* website navigation.

The navigation within the pages is provided by the set of large buttons aligned horizontally at the top of the page. On the far right, a vertical bar will facilitate navigation between layers.

The following list describes the navigation concept within a page at each layer.

Layer 1 No secondary page navigation will be provided. Instructions and help will be displayed directly on the page.

Layer 2 The secondary navigation, as vertical set of links on the left, will be provided for accessing user profile link and text entry controls. Help and instructions will be displayed directly on the page but additional help will be available in pop-up boxes.

Layer 3 The most extensive layer in terms of navigation. All available navigation links and controls will be provided (in the left and right vertical spaces). Help will be available in pop-up boxes.

4.5 Design Documents

This section includes essential design documents such as UML use cases and DFD diagrams and sketches of paper prototypes. Here is the list of figures:

Figure 2 The overall structure of the website.

Figures 3 Sketch of the *News* page (first layer).

Figure 4 Sketch of the *Carpool* page (first layer).

Figure 5 Sketch of the *Task Sheets* page (first layer).

Figure 6 Use cases for the *Aide's Aide*.

Figures 7, 8, 9, 10 Data Flow Diagrams for Aide's Aide Information Processing System.

Figure 11 Sketch of the Login page (first paper prototype tested).

Figure 12 Sketch of the News page (first paper prototype tested).

Figure 13 Sketch of the Task Sheet page (first paper prototype tested).

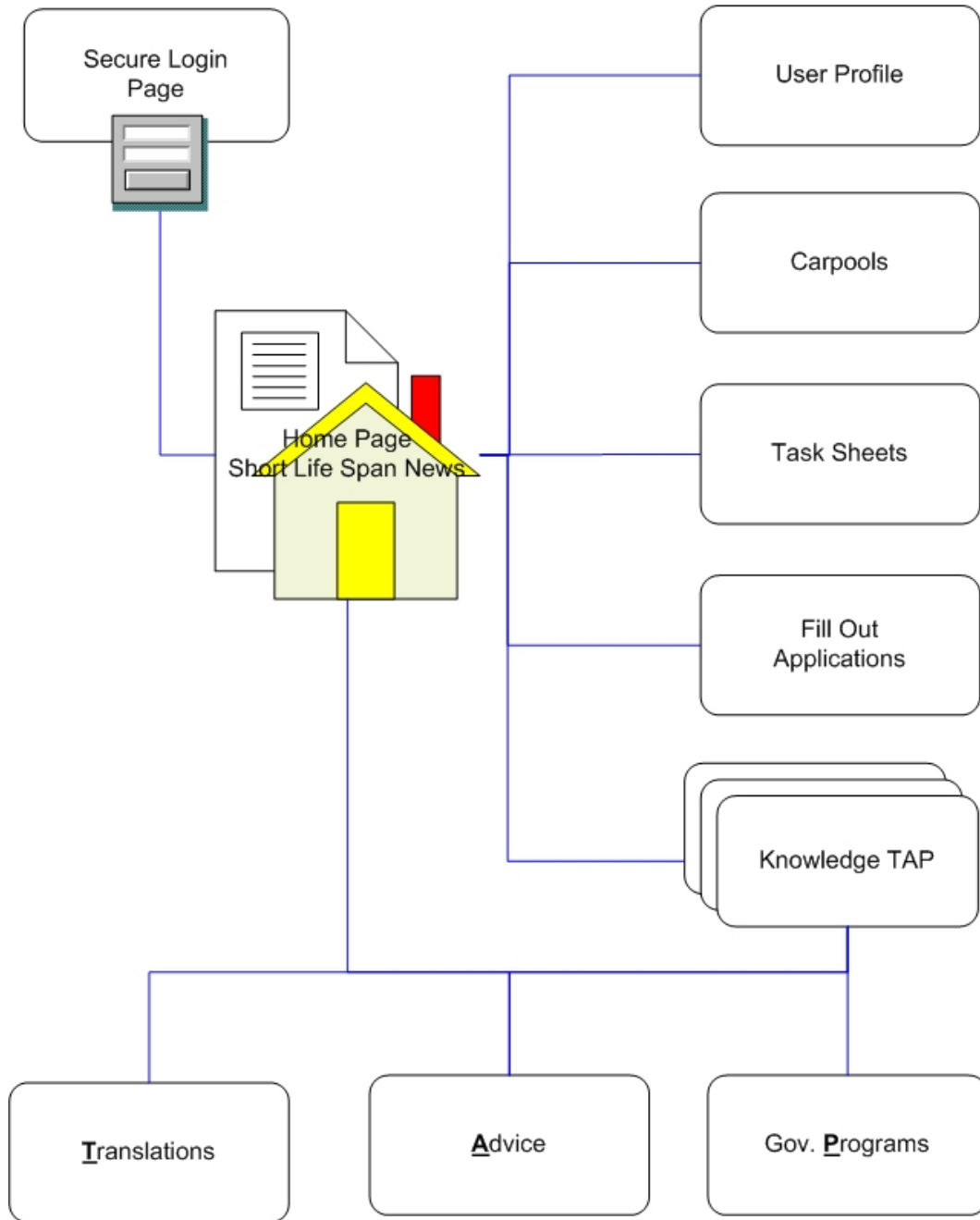**Figure 14** Sketch of the Carpool page (first paper prototype tested).

Figure 2: Aide's Aide Structure Diagram
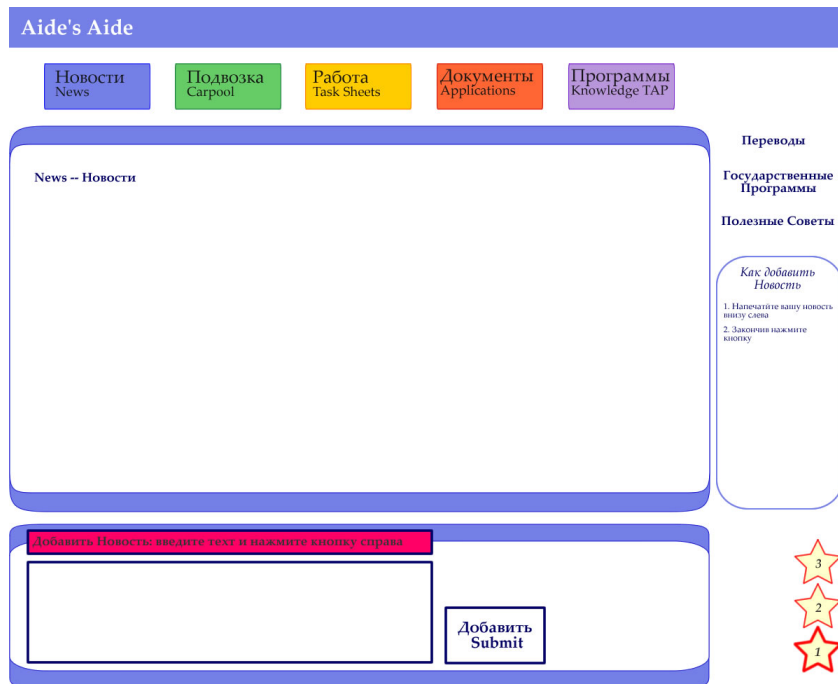
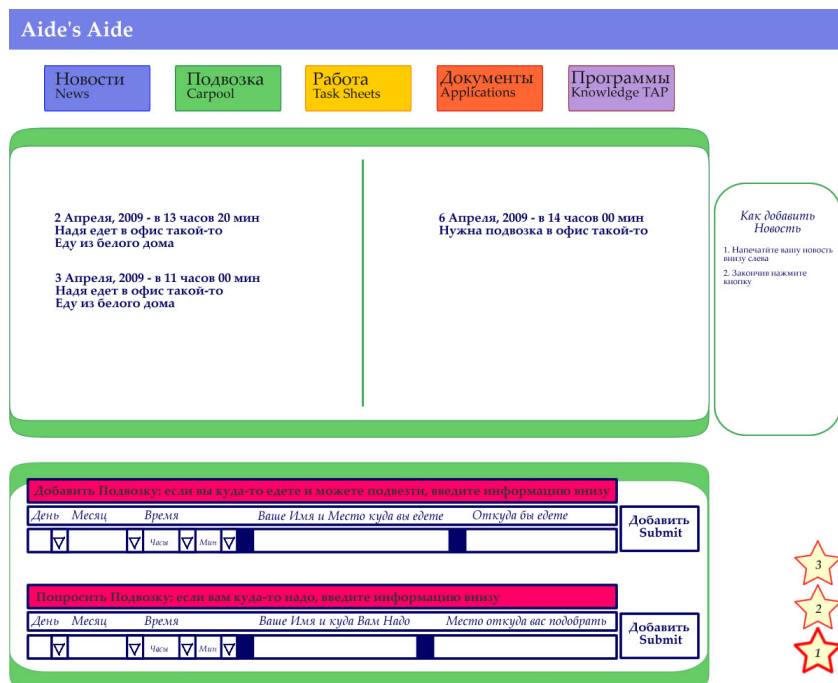Figure 3: Aide's Aide *News* (Home Page) Prototype

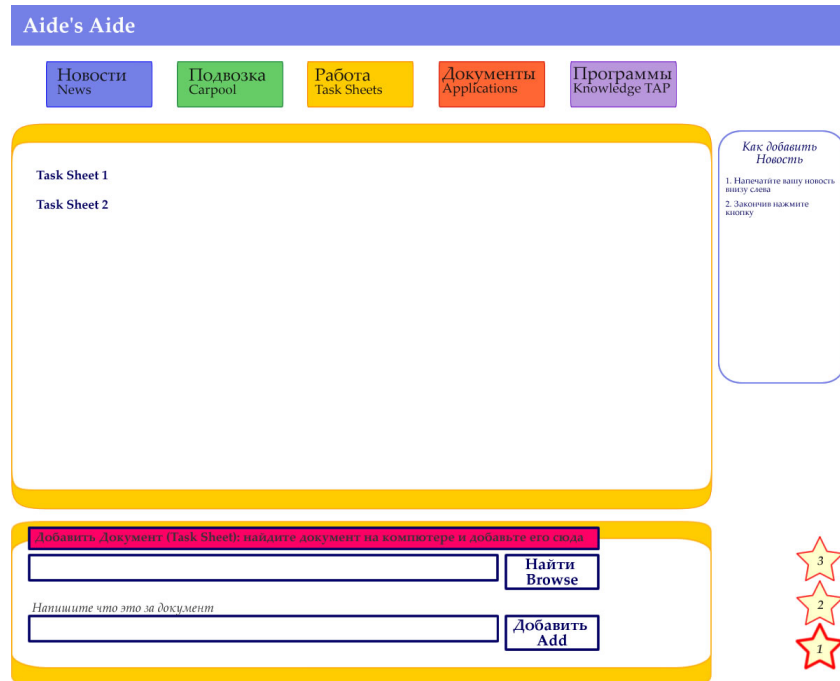Figure 4: Aide's Aide *Carpool* Page Prototype

Figure 5: Aide's Aide *Task Sheets* Page Prototype

4.6   User Scenarios

This section consists of a couple of scenarios that describe a user's possible interactions with system. The references to technology are intentionally removed to concentrate on usability issues rather than on technology and design constraints (Gaffney, 2000).

User Scenario 1: Find a ride to the office.   It's Sunday night. Tanya makes a phone call and finds out that her friend would not be able to give her a ride to the office tomorrow. Tanya goes to the *Aide's Aide* website to find a ride. She logs onto the website, navigates to *Carpool* section and looks for available rides. If there is none available, she leaves a request for a ride. To leave a request, Tanya specifies her name, contact phone number, date and hours when she needs a ride. Then she navigates to the *Advice* section and adds information about the new application process for subsidized housing.

User Scenario 2: Upload a sample application and add instructions on how to fill it out.   Galina's daughter just finished filling out a rent rebate application for one of her clients. Galina wants to share this application as a sample for others and save it for herself for the next time she might need it. Galina's daughter scans the document and saves it. Galina logs onto the *Aide's Aide* website, navigates to the *Applications* section and uploads her sample. She also adds the description and names the document. Then she navigates to the *News* section and reads the news.
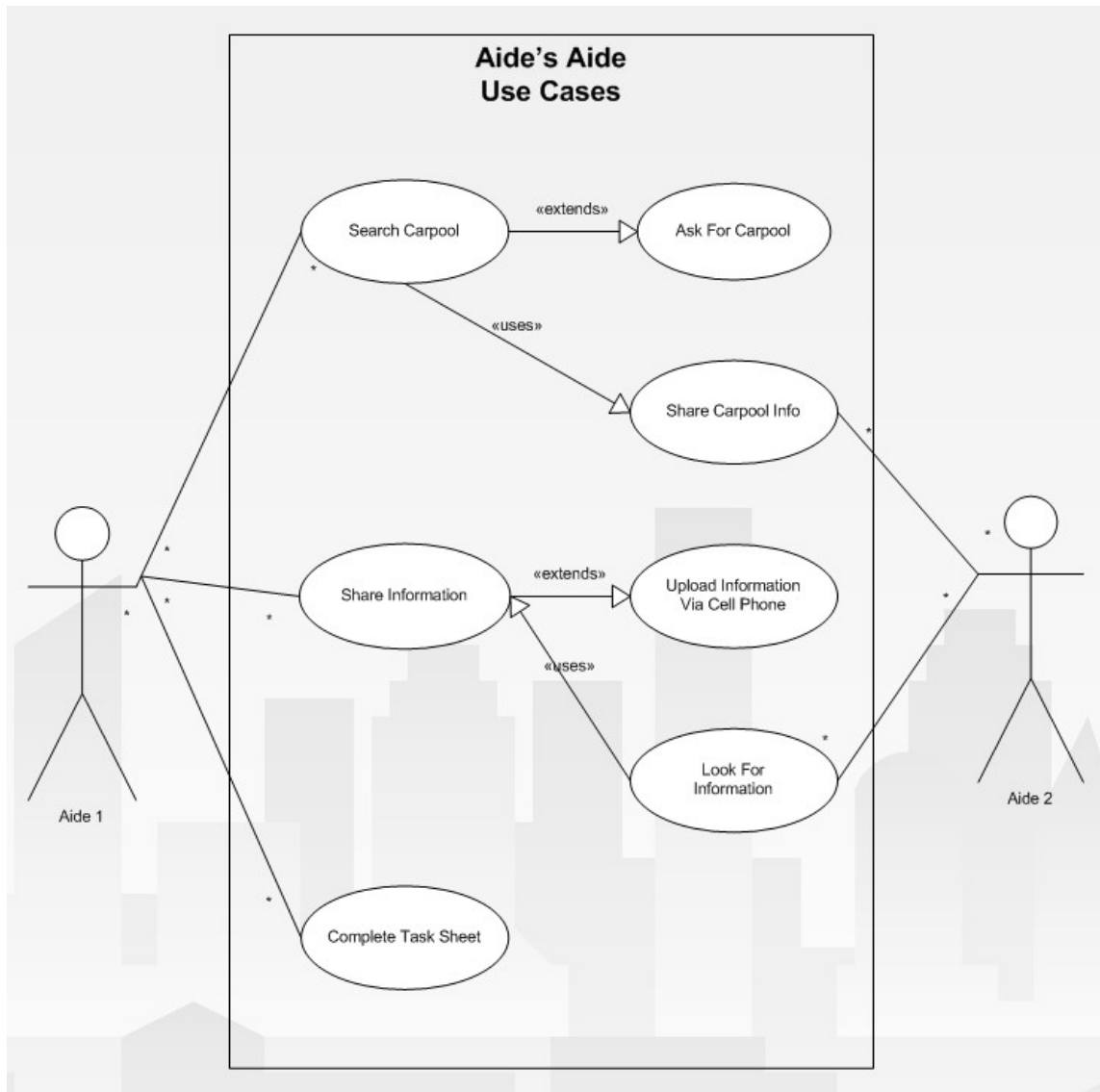
Figure 6: Aide's Aide Use Case Diagram

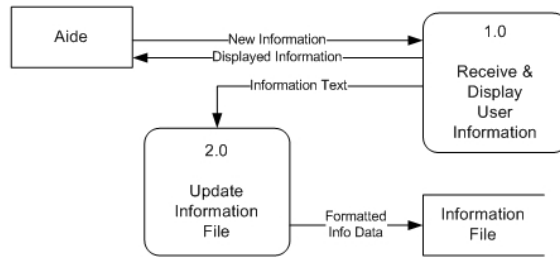Figure 7: Context DFD of Aide's Aide Information Processing System

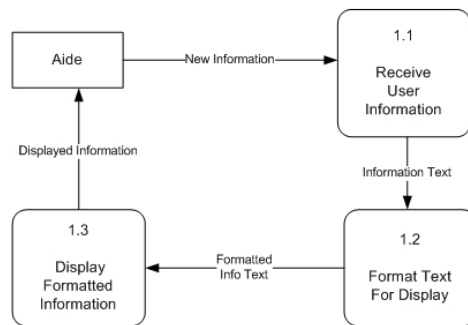Figure 8: Level-0 DFD of Aide's Aide Information Processing System

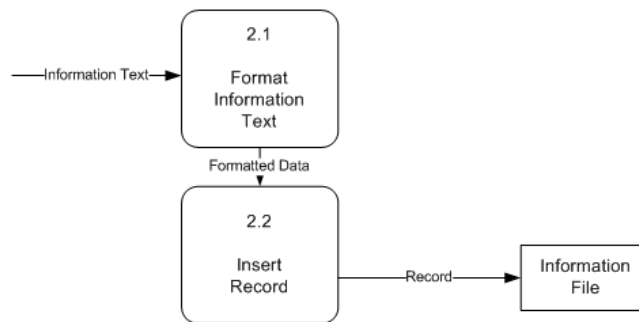Figure 9: Level-1 DFD of Aide's Aide Information Processing System

Figure 10: Level-2 DFD of Aide's Aide Information Processing System

5 Future Technologies & Social Implications

5.1 Future Technologies

Unfortunately, the future technologies rather inspired my design of the *Aide's Aide* system than are a significant part of it. Ubiquitous computing promise of natural interfaces (Abowd, 2000) is an ultimate goal of HCI research which still has not been fully reached. The *Aide's Aide* is a relatively simple and straightforward application that nevertheless intends to impact the life of a real community. It does not break the usual scheme of interaction between human and computer (i.e. desktop-bound interaction) and it is not a context-aware intelligent system. However, the principles and ideas that give direction to emerging technologies have definitely influenced the design of the *Aide's Aide*. The following trends in computing technologies had have direct effect on the design solution of the *Aide's Aide*:

1. *Natural interfaces* The concept of natural interfaces (i.e. reality-based interfaces) calls for utilization of existing users' skills and expectations from real world experiences rather than computer training and skills (Jacob et al., 2007). Natural interface systems use variety of nontraditional inputs to tailor its output to a particular user (Higel et al., 2003). During my interviews with users I realized that the concepts of natural interfaces would ideally suit the *Aide's Aide* system. The users are educated and have rich life experience but are not very familiar with the construct of a typical computer program or website, so their expectations for an interface would not be preset and they would be more adaptive to such technology. However, the resources and time constraints do not allow for creating a drastically new type of interface or input device. Instead, I focused on creating a website that would "feel" natural. For example, the website is color-coded by different categories in order to help users develop an effective mental model of the system (Wright, 1997).

2. *Context-aware computing* Context-aware technology takes the load off users in terms of complete attention to task, hardware and explicit input (Henricksen and Indulska, 2006). Again, this technology requires moving further away from desktop interaction and there are still no commercially available fully context-aware hardware devices. Otherwise, the *Aide's Aide* system would probably benefit the most from context-aware input. Aides could easily exchange their news at the source and without even getting distracted from their work. However, in real life, for the *Aide's Aide* system I utilize the ability of modern cell phones to take pictures, videos and send text messages at a location and send it over to the website. If an aide's phone has GPS chip the location where, for example, a picture was taken can be displayed on the map so other users can use a map to find that location and get directions.

3. *Aesthetics in application design* Aesthetics is not viewed as a technology and is definitely not an "emerging" discipline, but I have a strong belief that HCI community undervalued the influence of aesthetics on user experience. Aesthetic experience is often regarded as gazing on a pretty thing that hangs in a gallery. On the contrary,

aesthetics works in a context with user's culture, history, and experience and in conjunction with an artifact (e.g. software application) in his or her life (Wright, 2008). There are many important outcomes of aesthetics experience pertaining to computing technology[1], but for me the most important one is the feeling of unity (i.e. family relationship or personalization) with an artifact. In my design I want to capture the cultural attributes of the aide community to make them relate to the system but also make my design look elegant and not very generic.

5.2   Social Implications

The information technologies have the power to change people's lives (e.g. the Internet has changed our perspective on communications) creating a new paradigm of effective communication, and efficient processing and sharing information. Consequently, people's accomplishments or simply availability and variety of choices in their lives often depends on their ability to use technology to communicate, access and process information (Muller et al., 1997). Most people in developed countries like ours are not constrained by lack of access to technology or by lack of skills. However, there are some disadvantaged groups, even in countries like the United States, that suffer from *information and communication poverty*[2]. Examples of such groups include[3] elderly, battered women, prisoners, non-English-speaking communities, etc. When an information technology system enters such community, developer must take extra care to explore and understand future users because his or her system may become either a stepping stone to technological literacy or another failure on the part of the users to elevate themselves from information poverty.

The *Aide's Aide* may become one of such systems that help bridge the information availability gap between English speaking and non-English-speaking communities and ultimately raise the confidence level of aides in using computer technologies. It will not only comfort aides with familiar Russian language environment but also facilitate learning of English-language websites' structural and control elements (since the *Aide's Aide* elements are going to be bilingual). I am hopeful that ramifications of learning new technology will lead aides to further explore Internet's possibilities. For example, aides would save a lot of time and money if they start using online bill paying and banking.

There are also a possibilities of other social implications that the *Aide's Aide* system is capable of bringing. I hope this system will help aides save some time so they can become more involved in social communications (not only working relationships) with each other.

If successful, this website may elevate this community of practice to be legitimized, i.e. recognized by their organizations as a valuable asset (Wenger, 1998). It is important that

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[1]See works of Wright, P., Wallace, J, McCarthy, J., and Petersen, M.

[2]Information and communication poverty, according to Muller et. al. (1997), "is a condition resulting from an inability to communicate, access and process information critical to one's life and livelihood, due either to the absence of personal or technological means, or the unavailability of human agents to perform these tasks."

[3]Examples of disadvantaged groups were taken from HCI 655 class projects and my experience with non-English-speaking community.

home health aides' agencies start to pay attention to the needs of their workers and start to contribute to the efforts to save them time and money based on their (the agencies') ability to make changes to procedures. For example, agencies could allow faxing or electronic submission of weekly paperwork or provide online video training. That would significantly improve aides' work load.

5.3   Ethical Issues

There is a set of ethical concerns that may arise from the design of the *Aide's Aide* system.

- *Disclosure of sensitive information about patients.* Lives of the aides are tightly intertwined with lives of their patients. Aides often know patients' Social Security numbers, buy them groceries on their food stamps, know their habits, etc. It is quite possible that some of the sensitive information may appear on the *Aide's Aide* and, as a consequence, leak from the website. The design of the *Aide's Aide* makes security provisions to keep out outsiders, but it is harder to ensure that aides themselves would honor personal information of their clients or clients' other aides. I do not have a definite solution to this ethical issue. I am thinking of writing a code of conduct for the information disclosure. The website's moderator should also understand the issues of privacy and restrain himself or herself from using any private information; however, there is no mechanism to ensure moderator's honesty.

- *Aides' privacy.* A concern related to the previous one. Aides will leave their personal information on the website. If their information is abused they will likely abandon the website. This concern is not as strong as the previous one since website will be inaccessible to outsiders and the community itself is quite small, so a violator is likely to be easily identified.

- *Knowledge abuse.* There are some cases in the Russian community when people abuse (specifically, overuse) resources that government and/or charitable organizations provide for the elderly or poor. For example, some people exchange prescription medical equipment for other goods (say, household necessities) which definitely cost less and as a result the government overspends on Medicaid. I cannot predict or imply that this website might become a source of information abuse but this is a real concern that I do not have control of. The only solution I can offer is again to write a code of ethical conduct and publish it on the website.

6   References

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Wright, P., Wallace, J., and McCarthy, J., 2008. Aesthetics and experience-centered design. ACM Trans. Comput.-Hum. Interact. 15, 4, Article 18 (November 2008), 21 pages.

Appendices

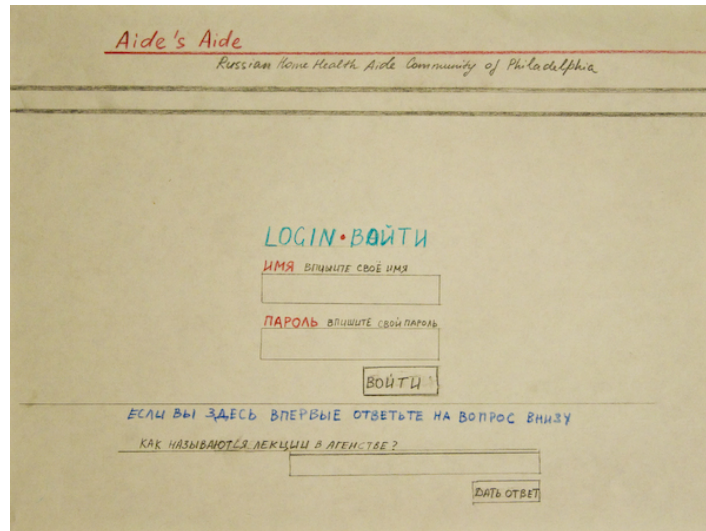## A Trial Paper Prototype

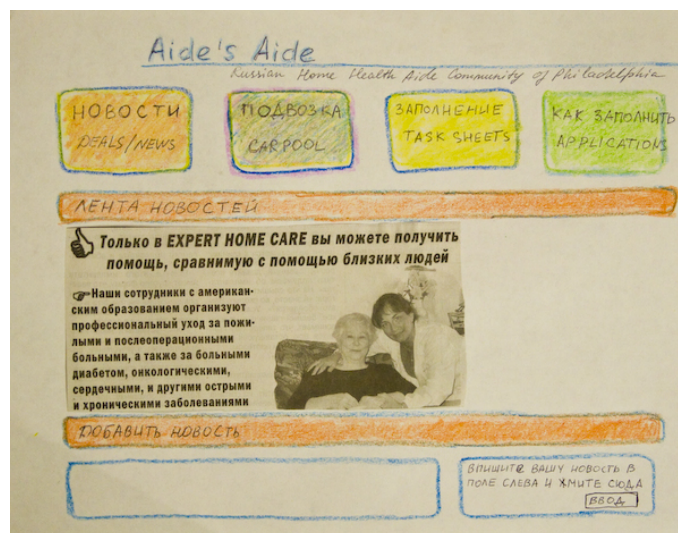Figure 11: First Paper Prototype: Login Page

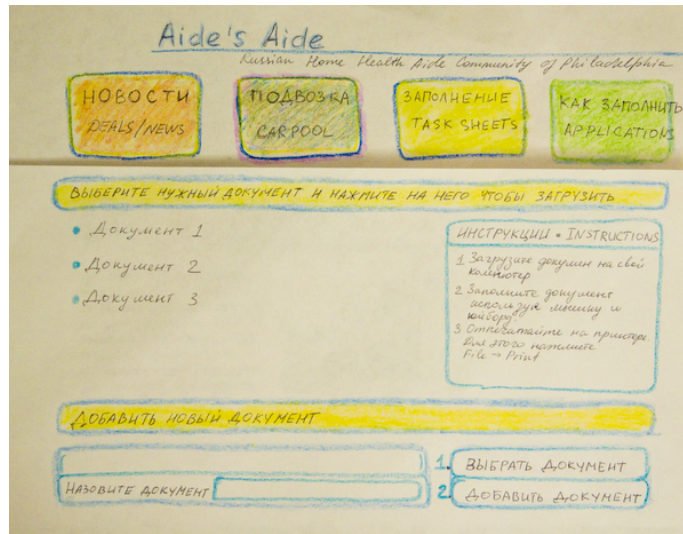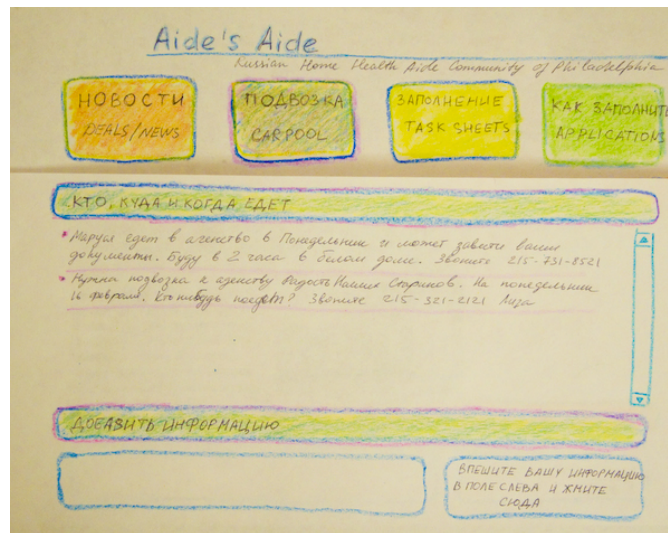Figure 12: First Paper Prototype: News Page

Figure 13: First Paper Prototype: Task Sheet Page

Figure 14: First Paper Prototype: Carpool Page