Aide's Aide: Assistance to Home Health Aides

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1 Introduction

1.1 Background

In the past decade, development of Internet technologies created a new paradigm and new opportunities for communication and information exchange. Online portals, video and photo sharing sites, blogs, wikis, etc. started to shape our life as once railroads, telephone, and electrical power did (David and Farno, 1965). All kinds of organizations, community groups and individuals strive to realize the amazing potentials of the online collaboration and knowledge sharing; however, for some groups the modern information technology seems to pass by their lives. The digital divide still exists between digitally literate people on the one side, and the elderly (Karahasanovic et al., 2008), those who face accessibility barriers (Dickinson et al., 2007), linguistic and cultural barriers (Sourbati, 2004), and probably many other disadvantaged groups on the other. While the HCI community has done a great deal to address the needs of the elderly and disabled people (Blythe and Monk, 2005), the needs of smaller disadvantaged groups are not as visible and therefore mostly ignored.

One example of such ignored group is a non-English-speaking communities that live in the United States. Usually these groups form city clusters where first and second generation of immigrants live in a close-knit community trying to preserve the way of life they brought from their home countries.

1.2 Users

The users of the *Aide's Aide* website are part of such a disadvantaged group. They live in a close-knit, Russian-speaking community and work as Home Health Aides with Russian speaking patients. Aides form a community of practice that exists across official organizational boundaries, is in an active stage of development (i.e. aides engage in joint activities, share information, develop relationships), but visible only informally to those who know about its existence (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members are highly educated, most of them are in their 50s, know little English, and their knowledge and skills are outdated and/or not relevant to American culture (e.g. it is hard to be a Soviet-trained accountant or "economic engineer" in a capitalist society).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.

1.3 Aide's Aide Website

There is no computer information system available to help home health aides to better do their job. 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. The pictures of the website prototype are displayed in Appendix, Figures 9, 10, 11, 12, 13, and 14.

The main idea behind design of the the latest prototype of the *Aide's Aide* website is to create multilayered structure for each page on the website i.e. lower level has limited functionality but simpler to use while higher levels have more functions and therefore require better computer skills. As users become more familiar with the site's functions they should be able to progress to the next layer.

1.4 Usability Testings

During course of the project development I performed two usability study sessions. This paper will report the results of the second one in detail. Here I would like to give brief results from the first one. The first usability testing was a short session with three users (the same aides that were participants in the second session). They evaluated a paper-based low-fidelity prototype. The goal of that session was the evaluation of the overall concept of the *Aide's Aide* website i.e. to see whether the users are comfortable with the fundamentals of its design (e.g. layout, composition, naming scheme, etc.). Participants were asked to browse through each of the websites categories and perform some tasks at each of them. There were no written tasks and tasks were not timed. I worked as a computer changing screens depending on the user inputs. I videotaped these sessions to review users' comments later. Generally, the results of the first session were very positive. Users liked and understood layout, everyone could easily found correct category menu and they were pleased with functionality. One of the users asked me "when *Aide's Aide* will be available to use" and another told me "that they are definitely in need of a such website." Based on the feedback from the first testing session I created a digital higher-fidelity prototype and performed second usability testing described below.

I decided to test only the first (simplest) layer of the prototype because I wanted to see how well the participants would manage to complete the simplest tasks. In case those tasks are too easy for a participant I kept handy an additional scenario with 4 tasks to test advanced functions. However, during testing I found that participants were not ready for more advanced tasks and the prototype itself had major usability issues that needed to be fixed before going any further.

2 Evaluation Methods

As suggested by Bailey (2006), successful usability testing should include measures of three main areas: effectiveness, efficiency, and satisfaction. In order to evaluate the *Aide's Aide* design with all three areas in mind I used task scenarios with the following measures:

1. the time to complete specific task as the measure for *efficiency*. "Time to complete" measure makes most sense in comparison with the same task that was completed without the use of a computer program or with a different different program. In my case I wanted to compare time to complete a task sheet by hand with the time to complete it using the prototype (I asked participants to time the process of filling out the form I used for the computer test). I also timed all other tasks for each participant in order to compare their completion times with times it takes a very proficient computer user to complete each task. This measure gives approximation of how fast or slow the participant can identify website's functions in order to complete a task. However, some tasks have portions where participants need to type in information, and these parts of tasks depend on the participants' abilities and computer skills, so not the whole of each task is suitable for benchmark comparison.

2. the number of correctly completed tasks as well as quality of the output of these tasks (where appropriate) as the measure for *effectiveness*. I asked participants to verbalize their thoughts and actions while completing the tasks. The think-aloud method should provide me with users' immediate reactions on the task at hand and this may be one of the best ways to understand users troubles or successes in completing tasks (Oyugi et al., 2008).

3. the questionnaires, user remarks and video recording of user experiences with the system as the measures for *satisfaction*.

Since it is impossible to test everything in one session I decided to focus my attention on whether the users understand the structure and functionality of the website. I designed the tasks to form a single usage scenario with gradual progression that takes user through registration, site exploration and then performing a task for each of website's major features (see Table 2 for complete list of tasks).

2.1 Participants

The following criteria were used for selecting participants: they should

- work as an aide or be an aide's patient,
- have at least some knowledge of computer technology, and
- work in the Philadelphia area.

One aide contacted two of her colleagues and one of the clients and recruited them for participation in testing of the *Aide's Aide* website. There were a total of five participants: three female aides, one male aide and a male patient of one of the aides. Their ages range from 45 to 70+ years old. All have post-high-school degrees, and all have had DSL Internet access at home for more than two years. Three participants access Internet daily and one, "not often." For the complete results of demographic questionnaire, see Table 1.

I tried to diversify test participants as much as possible based on their experience with the computer technology (i.e. have some experienced as well as some novice computer users). By having users with different degrees of experience I was hoping to assess whether the website is intuitive and simple to use for novice participants and whether the website's simplicity would satisfy the more experienced users. Three out of four participants consider themselves confident with technology to some degree and one person considers herself somewhat unconfident. It is interesting to note that, during the testing, both moderators concluded that the person with less self-reported confidence than others showed more understanding of the website navigation, faster time performance on tasks, and better understanding of Internet technology in general.

2.2 Testing Environment

Usability practitioners suggest that the testing environment should resemble the space in which the system will be used later as close as possible (Kuniavsky, 2003; Neal, 2004). I decided to conduct tests in an environment familiar to the users, i.e. at their own homes. I set up appointment times with each participant and brought my computer and camera equipment to every location. At each participant's house, we found a place where they actually use their own desktop or laptop computer to set up a temporary "usability lab." The equipment included two video cameras one of which captured video screen while the other captured the user's profile as he or she worked on the tasks (see Figure 1). I chose not to videotape participants from the front. Participants worked on a PC laptop computer with Windows Vista using Firefox browser with MS Internet Explorer engine. No Internet connection was needed since the prototype was run from the local host.

2.3 Test Format

The usability testing was conducted by two moderators (one of whom was myself). One moderator was taking notes and answered participants' questions and the other was timing the participants and was responsible for video recording.

For each participant, the test of *Aide's Aide* consisted of the following parts and activities:

Pre-test activities consisted of a short oral introduction of the *Aide's Aide* website, its purpose and its goals. Then the testing format and forms of observation were explained to the participants. We asked each user to talk-aloud while performing each task. Moderator explicitly explained to every participant that we are testing a prototype

Table 1: Participants' Demographics Questionnaire Results

	Question	**Participant's Name**				
#		*Galina*	*Tanya*	*Ella*	*Isaac*	*Boris*
1	Gender	Female	Female	Female	Male	Male
2	Age Range	56-60	45-50	56-60	61+	45-50
3	Consider this statement: "I am confident with technology."	Somewhat Agree	Somewhat Disagree	Strongly Agree	Agree	Somewhat Agree
4	Do you have Internet access at home?	Yes	Yes	Yes	Yes	Yes
5	If you have Internet access at home, what kind of Internet connection do you have?	DSL	DSL	DSL	DSL	DSL
6	If you have Internet access at home, how long have you had this access for?	2-3 years	>3 years	>3 years	>3 years	>3 years
7	How frequently do you access the Internet from home?	Not often	Daily	Daily	Daily	Daily
8	What do you mostly use the Internet for?	Read books	News	News	News, email, banking	News, read books
9	Level of Education	A.S.	A.S.	B.S.	B.S.	B.S.

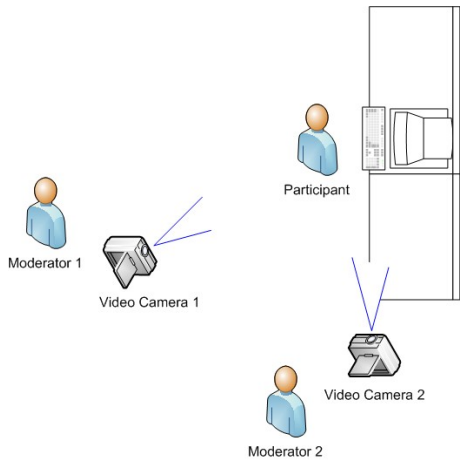

Figure 1: Testing Layout Configuration

of the website, not them or their ability. Each person signed a consent form (see Figure 7 in the Appendix) that stipulated understanding of the testing procedures and his or her rights as a participant. Finally, participants filled out a brief demographic questionnaire (see Figure 8 in the Appendix).

Testing activities involved testing of the prototype of the *Aide's Aide* website using close to a real-life scenario with tasks[1]. During the testing participants were videotaped from two different angles and timed for task completion. Moderators recorded time to complete each task, task success, and the number of errors for each task.

Post-test activities included filling out two questionnaires and an informal interview about specific problem areas and overall impression of the prototype. The goal of administering questionnaires and interview was collecting some qualitative data about user satisfaction with the system.

2.4 Tasks

Kuniavsky (2003) suggests producing and prioritizing a list of features that needs to be tested before writing a scenario and tasks. The criteria for selecting the websites' features were: (1) the feature should represent a typical user's activity on the website (e.g. writing or finding news), and (2) the feature was considered important by users (from prior interviews). Top six *Aide's Aide* features I selected for usability testing were:

1. *Registration and login system.* Can users register, login and retrieve their password if they forgot one?

2. *Navigation bar.* Can users navigate through it to find a specific section?

[1]Scenario and tasks were translated into Russian.

3. *Entry management.* Can users make news entries, edit and delete them as well as find them?

4. *Document management.* Can users upload, find and delete documents?

5. *Completing task sheets.* Can users download and effectively complete a task sheet?

6. *Carpool system.* Can people figure out what it is for and can they use it?

For each of the features that I selected for testing I designed a task scenario. Each task scenario requires 1 to 10 minutes to complete. Each participant attempted the completion of the tasks presented in Table 2.

2.5 Post-test Questionnaires

After finishing task scenarios, the participants were asked to fill out two questionnaires for assessing the usability of the website. The first one is the SUS (System Usability Scale) developed by Digital Equipment Corporation, 1986 and adapted by changing word "system" to "website" (see Figure 3). The second one is an adapted and stripped version of QUIS (Questionnaire for User Interface Satisfaction) developed at the University of Maryland (see Figure 2).

I selected SUS questionnaire to assess such aspects of the website's usability as complexity, need for training and support, and ease of use. The QUIS I selected in order to assess particular features of the prototype such as fonts, input fields, language etc.

3 Results

3.1 Task Completion Success Rate

One of the moderators recorded the participants' task completion success which is the ability to complete a task without prompting. Even though for such a small sample size computing the task completion success rate is not very meaningful I decided to include these calculations to clarify which tasks created problems for the participants. The task completion success rate was computed by dividing the number of successes by the number of participants completing the task.

Tasks 2, 3, 4 and 5 were not completed by at least one of the participants.

3.2 Time on Task

Moderator recorded time on task for each of the participants. Starting time was recorded at the moment when users stopped reading a task card and turned to monitor to perform

Table 2: Feature and Tasks List

Usability Session		
#	Feature	Task
1.	*Registration and login system.* Can users register, login and retrieve password if they forgot one?	You just heard from your friend that there is a cool website created specifically for your community of Home Health Aides and you decided to check it out. How would you become one of the registered users of the *Aide's Aide* website?
2.	*Navigation bar.* Can users navigate through it to just explore the website's features and content, understand it and not get lost?	You are in! Now you decided to browse the website and find out what features and content it offers. Find the section where: 1. you can enter your advice about Section 8 program; 2. you can download a sample of the Rent Rebate form; 3. you can find a carpool; 4. you can complete a task sheet; 5. you can enter news about discounts at new Target on Cottman street.
3. & 4.	*Entry management.* Can users make news entries, edit and delete them as well as find them?	Finally you got to the News section you where you decided to add your news about $5 coupon for $25 and over purchase that is available at the new Target on Cottman street this week only. How would you do it? Then you decided to find if there is news about this week's discounts at Bell's Market. How would you search for this news? Hint: in the "Search" text box, enter words "Bell's Market."
5.	*Document management.* Can users upload and find documents?	You just remembered that your client wanted you to find out how to fill out a Rent Rebate form. Can you find a section where samples of documents are located? Go to that section and find a sample of the Rent Rebate form.
6.	*Completing task sheets.* Can users download and effectively complete task sheet?	While you are at the website you decided to fill out task sheets for this week's work. Go to Task Sheets section of the website and complete all required documents.
7.	*Carpool system.* Can people figure out what it is for and can they use it?	The day after tomorrow at 3:00 pm you going to travel to Franklin Mills Mall. Your starting location is the lobby of the Shalom building on Bustleton street. You decided to offer a ride if someone else needs to go there as well. How would you do that?

Participant ID: _____ Site: _____ Date: ___/___/__

System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the website *today*.

		Strongly Disagree				Strongly Agree
1.	I think that I would like to use this website frequently.	☐	☐	☐	☐	☐
2.	I found this website unnecessarily complex.	☐	☐	☐	☐	☐
3.	I thought this website was easy to use.	☐	☐	☐	☐	☐
4.	I think that I would need assistance to be able to use this website.	☐	☐	☐	☐	☐
5.	I found the various functions in this website were well integrated.	☐	☐	☐	☐	☐
6.	I thought there was too much inconsistency in this website.	☐	☐	☐	☐	☐
7.	I would imagine that most people would learn to use this website very quickly.	☐	☐	☐	☐	☐
8.	I found this website very cumbersome/awkward to use.	☐	☐	☐	☐	☐
9.	I felt very confident using this website.	☐	☐	☐	☐	☐
10.	I needed to learn a lot of things before I could get going with this website.	☐	☐	☐	☐	☐

Please provide any comments about this website:

Figure 2: Questionnaire for User Interface Satisfaction

Aide's Aide
QUIS Questionnaire

Answer the following questions considering your experience with the Aide's Aide website.

			1	2	3	4	5	6	7	8	9	
1	Reading characters on the page	hard										easy
2	Organization of information	confusing										very clear
3	Language use throughout website	confusing										very clear
4	Terminology is intuitive	never										always
5	Position of messages on screen	inconsistent										consistent
6	Prompts for input	confusing										clear
7	Error messages	unhelpful										helpful
8	Learning to user the website	difficult										easy
9	Exploring new features by trial and error	difficult										easy
10	Performing task is straightforward	never										always
11	Website speed	too slow										fast enough
12	Website reliability	unreliable										reliable
13	Correcting your mistakes	difficult										easy
14	Designed for all levels of users	never										always

Figure 3: System Usability Scale

Table 3: **Task Completion Rates**

Participant	*Task 1*	*Task 2*	*Task 3*	*Task 4*	*Task 5*	*Task 6*	*Task 7*
Galina	✓	-	✓	-	-	✓	✓
Tanya	✓	✓	✓	-	✓	✓	✓
Ella	✓	✓	✓	✓	✓	✓	✓
Isaac	✓	-	-	-	✓	✓	✓
Boris	✓	-	✓	✓	✓	✓	✓
Success	5	2	4	2	4	5	5
Completion Rates	100%	40%	80%	40%	80%	100%	100%

Table 4: **Time on task (TOT) in seconds**

Participant	*Task 1*	*Task 2*	*Task 3*	*Task 4*	*Task 5*	*Task 6*	*Task 7*
Benchmark	58	119	122	31	62	N/A	123
Galina	323	273	316	112	281	456	433
Tanya	108	116	86	86	46	397	200
Ella	190	233	204	31	267	475	230
Isaac	120	260	278	46	92	411	182
Boris	150	262	192	37	48	371	144
Average TOT	178.2	228.8	215.2	62.4	146.8	422	237.8

the task and finished when the moderator concluded that the task was complete. In cases where task was not complete moderator asked participants to stop and move on to the next task and recorded time at that moment.

Some tasks required more time to complete than others. For example, completion of task sheets (task 6, Table 2) is the most time consuming task since it required completion of a whole document. It took more than 6 minutes for each of participant to complete with the lowest time 371 seconds and the highest 475 seconds. The average time to complete the task sheet by hand, as self-reported by users, is 191 second. The shortest task was search for news with average time to complete of 68.75 seconds and lowest and highest times of 31 and 112 seconds respectively. The complete time on task data along with benchmark times (time to complete tasks by a very advanced user) is presented in Table 4.

3.3 Errors

Since I am the one who is most familiar with the website I recorded the number of participants' errors on the tasks. There were the following kinds of errors:

- Omitting required fields
- Trying to login instead of registering

Table 5: **Summary of Task Completion and # of Errors**

Task	*Task Completion by # of Participants*	*Total # of Errors per Task*	*Mean # of Errors per Task*
1	5	6	1.2
2	2	9	1.8
3	4	5	1
4	2	6	1.2
5	4	9	1.8
6	5	4	0.8
7	5	9	1.8

- Selecting wrong menus or wrong links identified as the needed menu
- Entering inputs in a wrong field
- Entering wrong input
- Clicking wrong button
- Clicking button without entering input
- Mistaking some features for others

The total and average number of errors per task and number of tasks completed per participant are summarized in Table 5. The number of errors per participant in each task is presented in Figure 4.

3.4 Questionnaire Results

After task session completion, participants rated the site and their experience with it. The results are displayed in the Figures 5 and 6. The numbers on horizontal axes represent numbers of questionnaire questions (for actual questions refer to the Figures 2 and 3. For SUS questionnaire, the scale for each even question was reversed in order to provide a uniform scale from the most negative to the most positive experience.

3.5 Qualitative Results

During the test we collected comments participants made while performing tasks. Here are the comments for each task made by each participant:

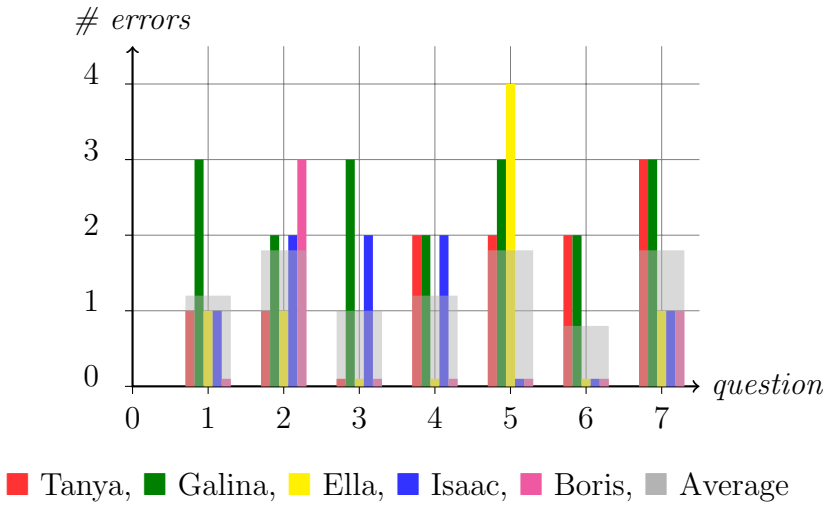

Figure 4: Number of errors by participant

3.5.1 Post-testing users comments

After testing session I asked participants to express their opinion about and their experience with the prototype. To summarize, users liked the overall appearance of the prototype, almost all participants said that if they had a chance to do the test again it would take them much less time and they would be more effective, others felt that website was easy to use. Interesting that even the participant that made the most number of mistakes felt that the website was easy to use.

Some participants suggested additional features or improvements:

- change news display format to make them more visible, perhaps the alternating colors should be brighter and a larger font size should be used;
- in the carpool section, add a function so you can click to select a person for carpool from the list, and then his or her information displays separately from the others;
- after login/register, create an additional page with only the navigation links so the user can select where he or she wants to go first.

Overall, participants showed enthusiasm and interest toward using the website. They wanted to explore it more and try the functions they did not have a chance to try.

4 Discussion

Even though four out of five participants identified themselves as being at some level confident with technology, moderators observed that only two users were familiar with technology.

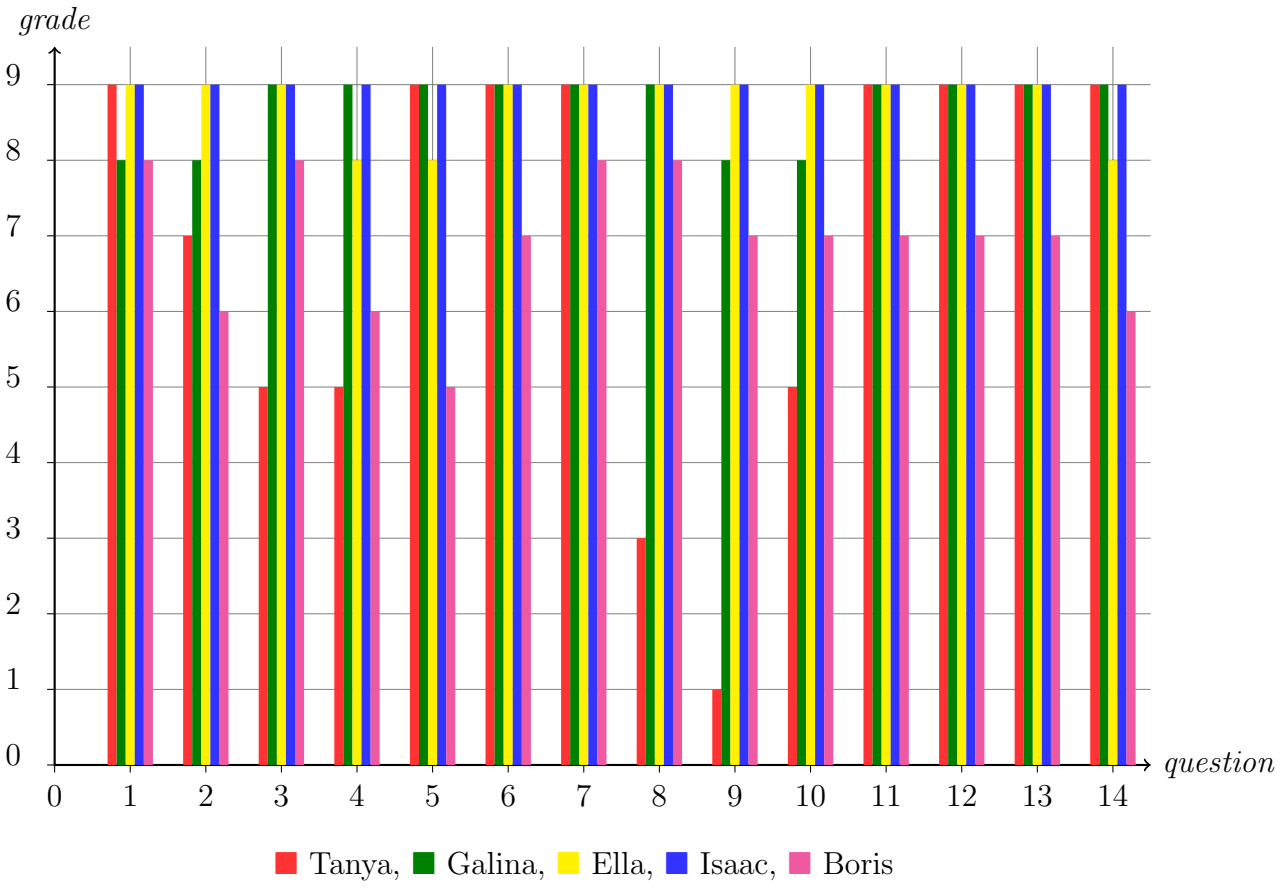

Figure 5: Aide's Aide Session USE Questionnaire

Others turned out to be pretty much novices and unfamiliar with basic computer operations. Two users did not know how to scroll. They and another user had frequent problems with the cursor, e.g. to enter text in a search box one usually has to insert cursor in the search box first. Additionally, all participants were not very confident with keyboard operations. Since they are the real, potential users for the website, their lack of basic computer technology understanding makes the identified usability problems more severe.

4.1 Findings

To be consistent with the testing objectives I discuss the findings in terms of efficiency, effectiveness and the user satisfaction with the *Aide's Aide* website's prototype.

4.1.1 Efficiency

The data shows that it is faster for users to complete hand written form than computerized one. On average users spent twice as much time (N = 4, Mean = 191 vs. N = 5, Mean

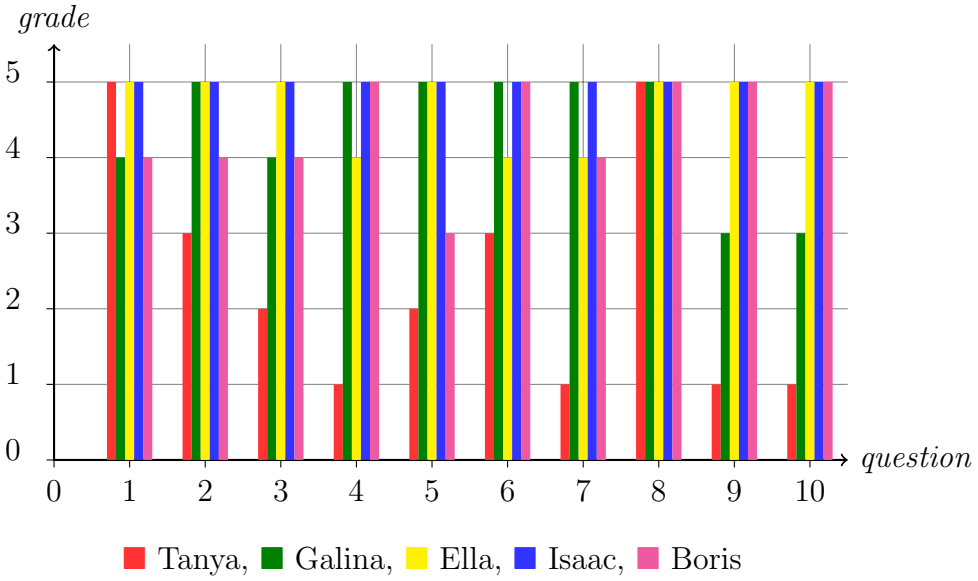

Figure 6: SUS questionnaire for Aide's Aide website

= 422) to finish the computerized form. There are obvious explanations to this failure of prototype to beat legacy method. First, participants are very slow typists so it took them a lot of efforts to type in names. Second, since aides rarely change their routine, the task sheets are almost identical from week to week so the prototypes' forms were designed to be efficient when reused. In other words, a first time user takes time to type in all the information, then saves the document and reuses it every week.

Benchmark comparison of other tasks also shows that participants were much slower (2-3 times) in performing tasks than an experienced young user. Again, this may be partly attributed to slow typing speed and/or slower motor functions and impaired vision of older participants. On the other hand, all participants commented that they would do tasks faster if they got a chance to explore and learn the prototype first, so I think efficiency of the website can be significantly improved as users start to get acquainted with the website. As a positive sign in that direction, the questionnaire results indicate that all but one participant agree that most people can learn to use this website very fast and they would not need any additional help for that (SUS questions 4 and 8, results in Figure 6).

Overall, I believe that efficiency is not going to be a significant issue that would prevent aides from using the website.

4.1.2 Effectiveness

Effectiveness of the website (or lack thereof) might have resulted in much more adverse effect on user willingness to use the website. Results presented indicate that there are several areas that needs immediate designer's attention in order to improve effectiveness. Tasks completion

Table 6: Participants' Comments per Task

Task	Participant	Comments
Task 1	Galina	"I do not want to enter my patronymic. Do I have to enter it?"
	Tanya	"What a pretty page!" "What is a patronymic?"
	Ella	"Characters in the password field need to be converted to asterisks for protection. Because everyone can see my password. Secret question also needs to be protected."
	Isaac	"Why can I see my password? It is not right."
Task 2	Galina	"I don't understand where are those sections!" [clicked on home page link]"I clicked on something and nothing happened"
	Tanya	"It is very pretty website"
	Ella	"Wonderful, website greets me!", after task completion: "Oh! Now I understand where the news are."
	Isaac	"Oh, I can delete whatever I do not need" "How do I go back? [refer to navigation from one page to another]"
	Boris	"Very pretty looking page and easily understandable."
Task 3	Galina	"I need to find something but I do not know how."
	Tanya	"Oh [sighs] where am I?"
Task 4	Galina	"Good, I did it!" [she did not complete the task]
	Ella	"Wonderful! I got it!"
	Isaac	"Where is the search field?"
Task 5	Galina	"I need training before I can use this program."
	Tanya	"I do not know how to save a document"
	Ella	"Oh my God! Here it is in front of me [refers to a document she was trying to find all over the page]."
	Isaac	"This navigation is new to me"
	Boris	"I do not know which page I am on now."
Task 6	Tanya	"I do not remember how to save pdf forms"
Task 7	Galina	"This website is easy!"
	Isaac	after finishing last task: "It was easy!"
	Boris	"An interesting feature," "It is not good that you need to scroll to see everything that's on the page."

rate is a good indicator of the problem areas. Tasks 2 and 4 have only 40% completion rate which means that only two persons out of five completed the task. Task 4 asked users to find news on the News page of the website (for reference of prototype's design see Figure 10). They needed to enter search criterion in the search box and press the Search button. The main problem with this task was that users could not find the search box. Two users (Galina and Isaac) entered their search in a wrong field (in the same input field they just

entered news). It is interesting that the most experienced users (Ella and Boris) found the search field immediately and did not have any problems with the task.

A similar situation was observed for other tasks that were not completed by some participants. Three users could not find the navigation bar (Task 2) to browse through pages (they were looking for it at the bottom of the page and in the page's body) and other users could not immediately find it either. After the participants figured out or were told about the location of the menu bar they had no more problems with navigation and seemed to be very comfortable in identifying locations for the subsequent tasks.

Along with huge usability issues that resulted in task failures there is might be an additional factor that contributed to users' confusion. Users were asked what kind of websites they use and how they navigate them. Most users just read news using news websites like "www.lenta.ru" and Russian version of BBC news, and no one uses social networking sites. Additionally, one user checks his bank account online and has Google email. Most of these websites have the left navigation menu and those that do not, have just a text link menu (Google email). This may be the reason why the participants during the "navigation" task tried to find menu categories in the body of the website and tried to click on text links there instead of on the buttons at the top of the page. Thus, it may be inferred that users were unfamiliar with the prototype's type of navigation (as well as with the location of the search box in task 4) and therefore became ineffective but swiftly recovered from that once they were told or figured out where the controls were.

Tasks 5 and 6 had similar subtasks, where users had to download document from website. In Task 5 test participants had major problems in finding and selecting the right document from the list whereas in Task 6 participants had no problems at all. There is a significant difference in presenting documents in those two pages (see Figure 13 for Task 5 and Figure 12 for Task 6). The document icon with the title is more intuitive and understandable as a form of presentation than document titles written in table format with links next to them.

Overall, I think that if the mentioned usability issues are promptly addressed website's effectiveness would be greater improved.

4.1.3 Satisfaction

Despite some usability problems questionnaire results and participants' comments show overall satisfaction with the website's prototype.

Based on SUS and QUIS questionnaires all participants want to use this website and none of them finds it cumbersome and/or awkward to use. Three participants even felt confident using it and four at different levels agreed that it was easy to use and designed for all levels of users.

Several questions of QUIS mostly addressed users' experience with particular functions or features of the prototype. Users were especially satisfied with use of language, speed, reliability, ability to correct one's mistakes and error messages provided. Users were somewhat less satisfied with the intuitiveness of terminology.

During the test several users commented positively on website's appearance and the clarity of presented information. After the test all users told me that they would definitely

use this website and in one case I overheard from the different room one user telling another that even though she needs to learn more about how to use it she had a lot of fun with it and wanted "take a usability test again." Some users even got in creative mood and started to suggest improvements and new features (see Section 3.5). Based on the overall mood after the testing I think the users would really like to have more advanced features and my idea of multilayered design might work, but I definitely need to continue testing and refining my prototype.

Even though participants showed satisfaction and great enthusiasm toward the prototype, I need to mention that participants might have been somewhat biased to like the prototype since they know me and may be afraid to offend me by harsh comments.

4.2 Usability Problems and Solutions

Based on the data collected, video recording and moderators' observation the following usability problems were identified and assigned a severity rating.[2]

Problem 1. Severity - High, Location - Throughout website Users are confused when asked to navigate from page to page. The navigation menu bar does not grab their attention and they look for it in other places. They start to recognize the navigation menu bar only when moderators show them its location.

Possible solution: make scrollable only the body of pages so the navigation menu is always visible, add visual elements (graphics icons) for better visualization. Additionally, the second text links navigation menu on the left side may be considered.

Problem 2. Severity - High, Location - Throughout website Some users are confused about their current location. The distinction between pages is unclear. Color coding is insufficient to clearly distinguish one page from another.

Possible solution: add page title to each webpage.

Problem 3. Severity - High, Location - Applications page Hard to find and download documents. Currently, documents are displayed in a table format with the database id as the first column. Users have hard time to find needed document in a table since they confuse database id and document title (when it has number in it). They also have hard time to find a link to download document.

Possible solution: Avoid displaying database id. Display documents in more visual form e.g. in form of icon (like in Task Sheets section) with the title of a document written on it.

Problem 4. Severity - Medium, Location - News Page Users cannot find search feature on the News page. Search field is located under the field for adding news. Even though they are different in size, users easily mistook one for another.

[2]The severity ratings were adapted from "Usability severity codes" by Usability & Technical Documentation, Xerox Corporation, July 1995. See Appendix Table 7 for detailed description of the severity ratings.

Possible solution: change location of the search feature, add caption and help inside the search field (something like "insert search criteria here").

Problem 5. Severity - High, Location - Carpool page If user enters time in 12-hour format with am/pm characters added, the error occurs that crashes the program.

Possible solution: Change code for either validate field for 24-hour format or convert user input in database format.

Problem 6. Severity - Medium, Location - Throughout website Even then users were confused they did not use help on the page. Help bar does not function as intended (i.e. users do "see" it and therefore it is not helpful for them).

Possible solution: Provide help at the controls level i.e. provide help at the very location where users perform their tasks.

Problem 7. Severity - Medium, Location - News page Insert-news field does not have validation if empty resulting in inserting an empty piece of news into database.

Possible solution: Validate insert-news field.

Possible solution: Provide help at the controls level i.e. provide help at the very location where users perform their tasks.

Problem 8. Severity - Medium, Location - Login page Users confused by the requirement to enter their patronymic. They do not understand why it is necessary.

Possible solution: Provide a clear explanation for users about the purpose of this requirement at the point of entry their patronymic name or ask user to provide an answer to a more generic security question.

4.3 Reflection

This usability testing was an eye opening experience for me. I thought that my prototype was very simple with minimal functions. Nevertheless, it still was confusing for users. I was frustrated that I did not get a chance to test second layer of my prototype but with present state of the users experience and present state of my prototype I felt that it might be useless attempt. On the other hand, some of the usability problems of the prototype resulted from ignoring common usability principals. For example, the prototype did not have page title at the top of each page which probably added to the users' confusion of the location they were at.

In addition, I started to understand that novice computer users are not conformists i.e. they look for features in most unusual places like search in "browse" field. A designer must be extra careful designing for novice users. No assumptions should be made as to what users already know or implicitly understand. Next time I would probably have shorter sessions with fewer tasks but test the prototype more often. In this case I would be able to refine the prototype based more on the user feedbacks than on my assumptions.

The process of building the mixed-fidelity prototype was too long and took a lot of effort (both learning and implementation). I am still a proponent of mixed-fidelity prototypes since I was able to observe users in as close to actual environment as possible. However, next time I would definitely implement fewer real back-end functions such as databases, cookies, session data gathering and concentrate more on the user interface functions. That would save me a lot of time.

My design, as I planned it, is still far away from being final. I need to correct discussed usability problems, create additional layers and test it again and again. Designing and testing the prototype for me was a very intriguing experience. I found a research topic that in my opinion is worth exploring further and if I had continued studying I would have definitely researched the topic of comparing preferences of user interface of novice computer users (not only old people but also children) with that of the experienced users. It would be interesting to see whether the legacy interface standards are the results of users' intrinsic preferences or something that was developed and imposed on users by the interface designers.

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Appendices

Understanding Your Participation

Please read this page carefully.

I, Elena Maximova, am asking you to participate in evaluating the Aide's Aide website. By participating in this evaluation, you will help me identify usability issues and improve this website.

I will observe you and record information about how you work with the website. I also ask you to fill out questionnaires and maybe answer some interview questions.

I will videotape all or some of your work. By signing this form, you give your permission to me to use your voice, verbal statements, and videotaped pictures for the purposes of evaluating the website and showing the results of these evaluations to my graduate committee. I will not use your full name.

You may withdraw from this evaluation at any time.

If you have any questions, you may ask now or at any time.

If you agree with these terms, please indicate your agreement by signing here:

Please print your name _____

Signature _____

Date _____

Figure 7: Consent Form

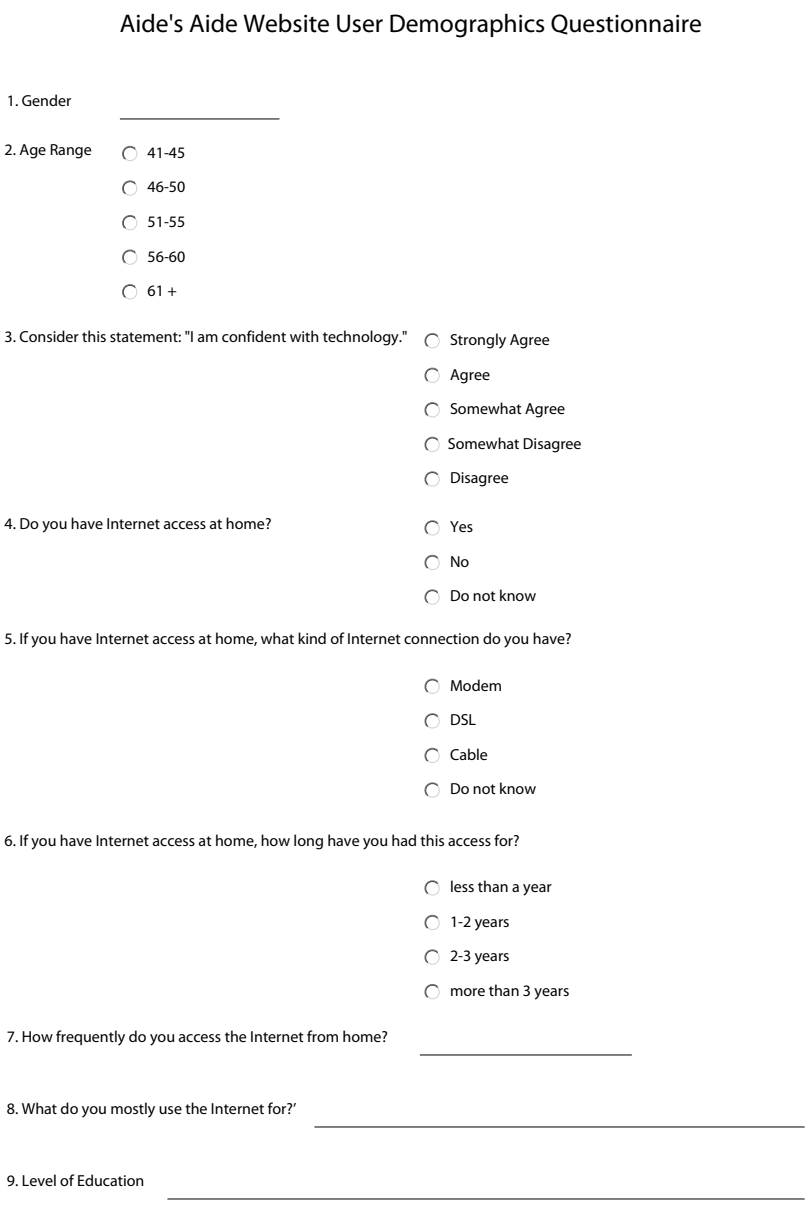

Figure 8: User Demographics Questionnaire

Table 7: **"Usability severity codes" by Usability & Technical Documentation, Xerox Corporation**

Severity Code	*Description*
Critical	An emergency condition that causes the customer's system to fail or causes customer data to be lost or destroyed. A showstopper usability bug can also be one that is likely to cause frequent data integrity errors. There is no workaround to these problems. A key feature needed by many customers is not in the system.
High	A serious condition that impairs the operation, or continued operation, of one or more product functions and cannot be easily circumvented or avoided. The software does not prevent the user from making a serious mistake. The usability problem is frequent, persistent, and affects many users. There is a serious violation of standards.
Medium	A non-critical, limited problem (no data lost or system failure). It does not hinder operation and can be temporarily circumvented or avoided. The problem causes users moderate confusion or irritation.
Low	Non-critical problems or general questions about the product. There are minor inconsistencies that cause hesitation or small aesthetic issues like labels and fields that are not aligned properly.

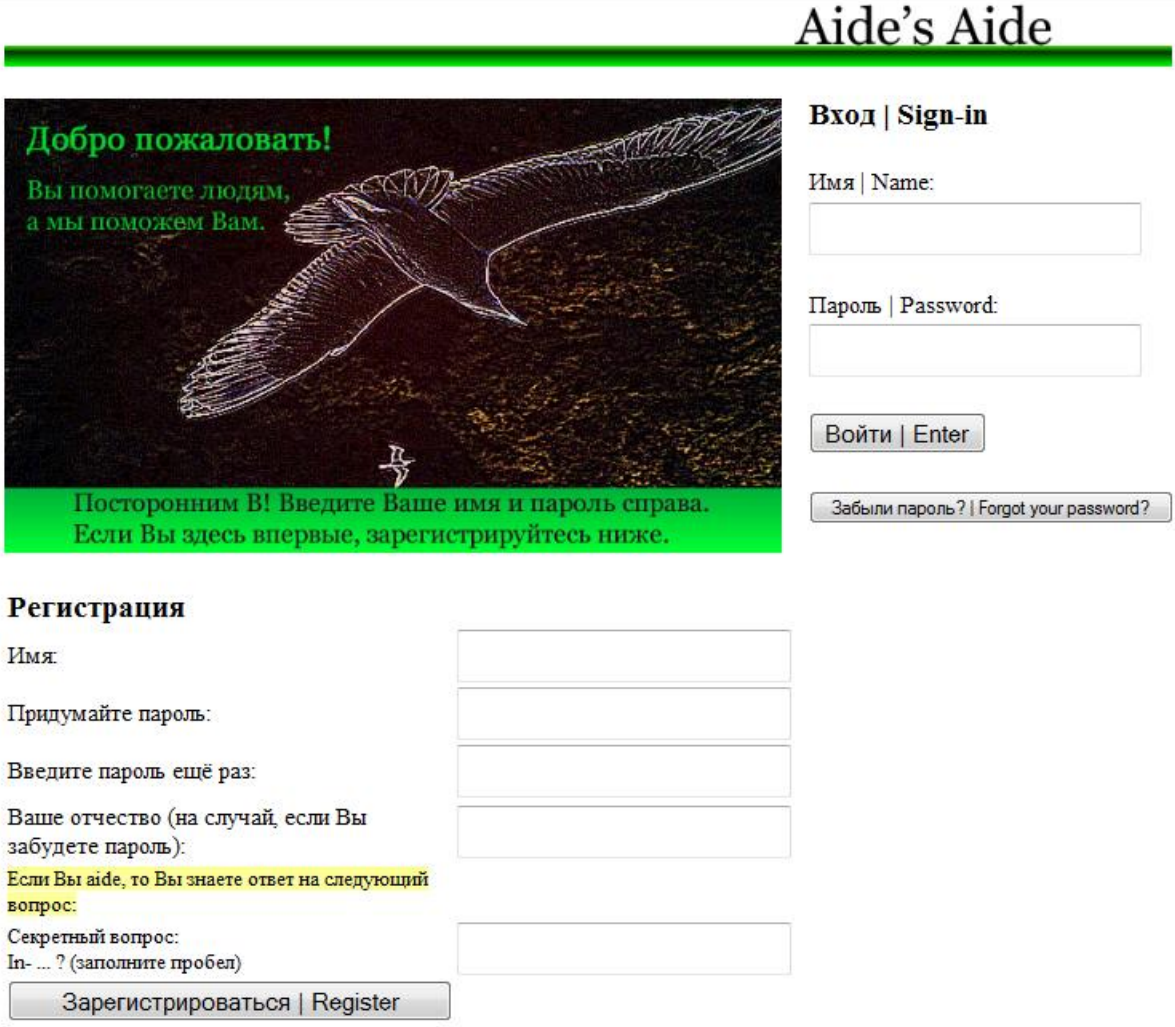

Figure 9: Login Page

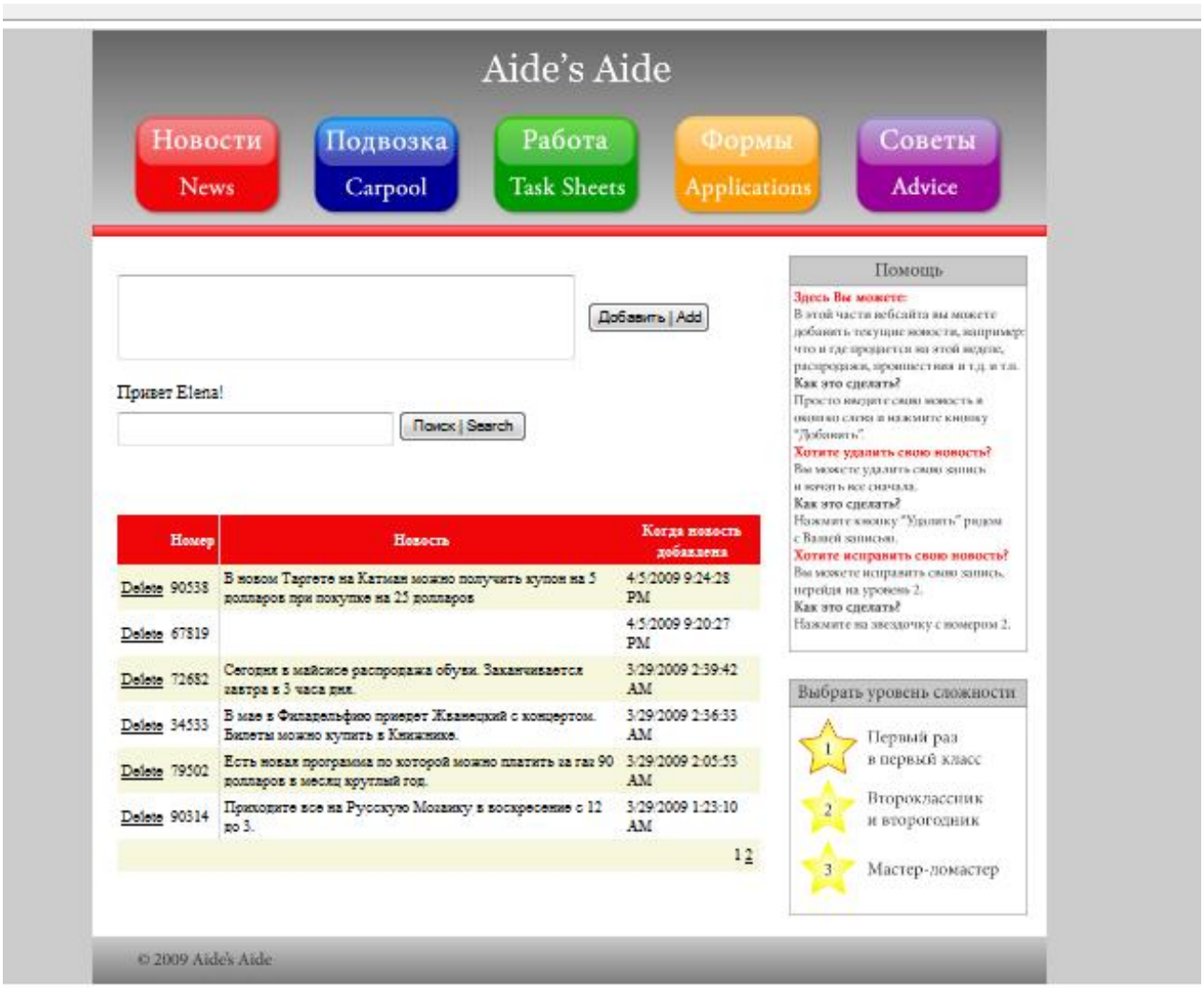

Figure 10: News Page

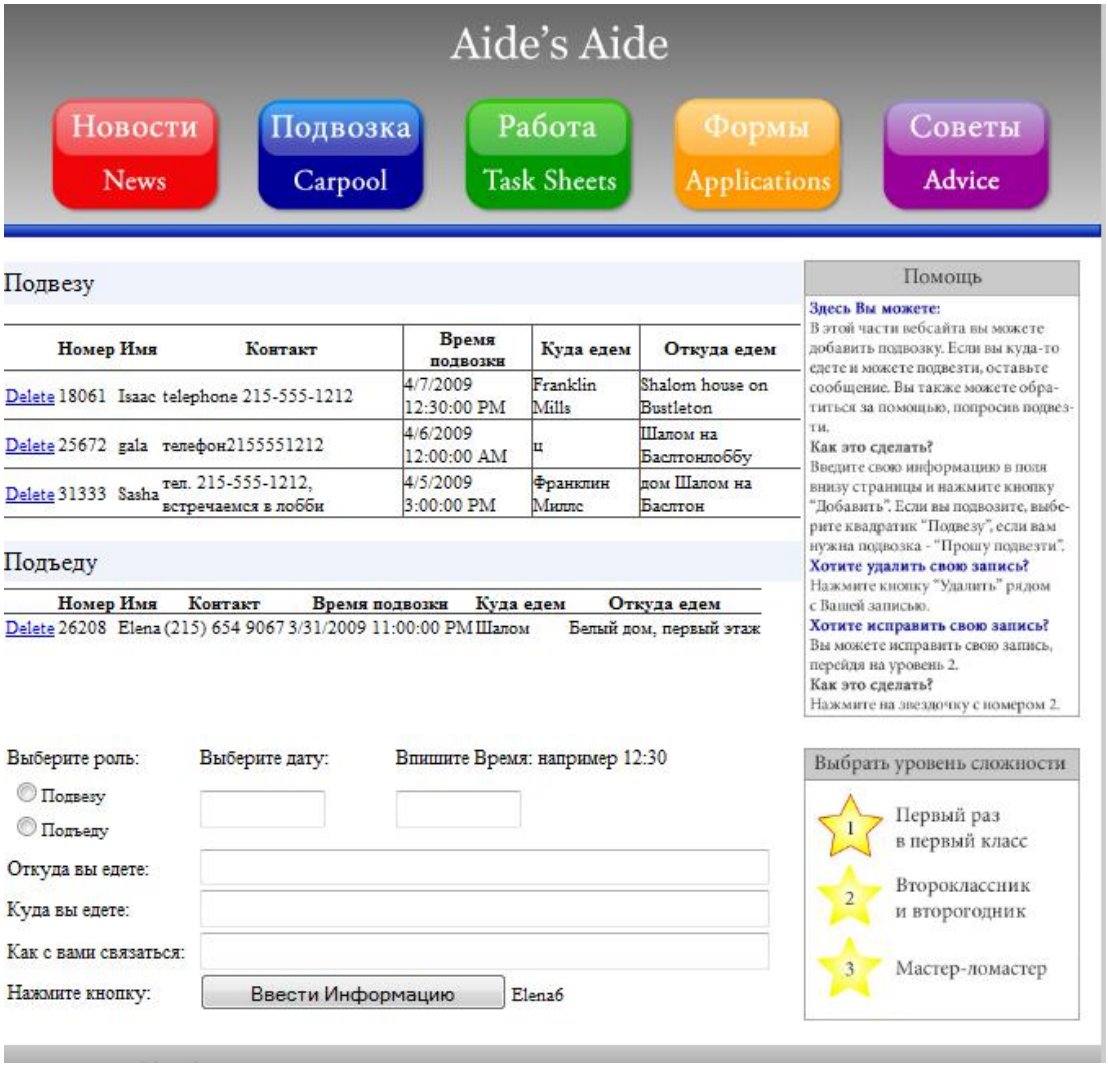

Figure 11: Carpool Page

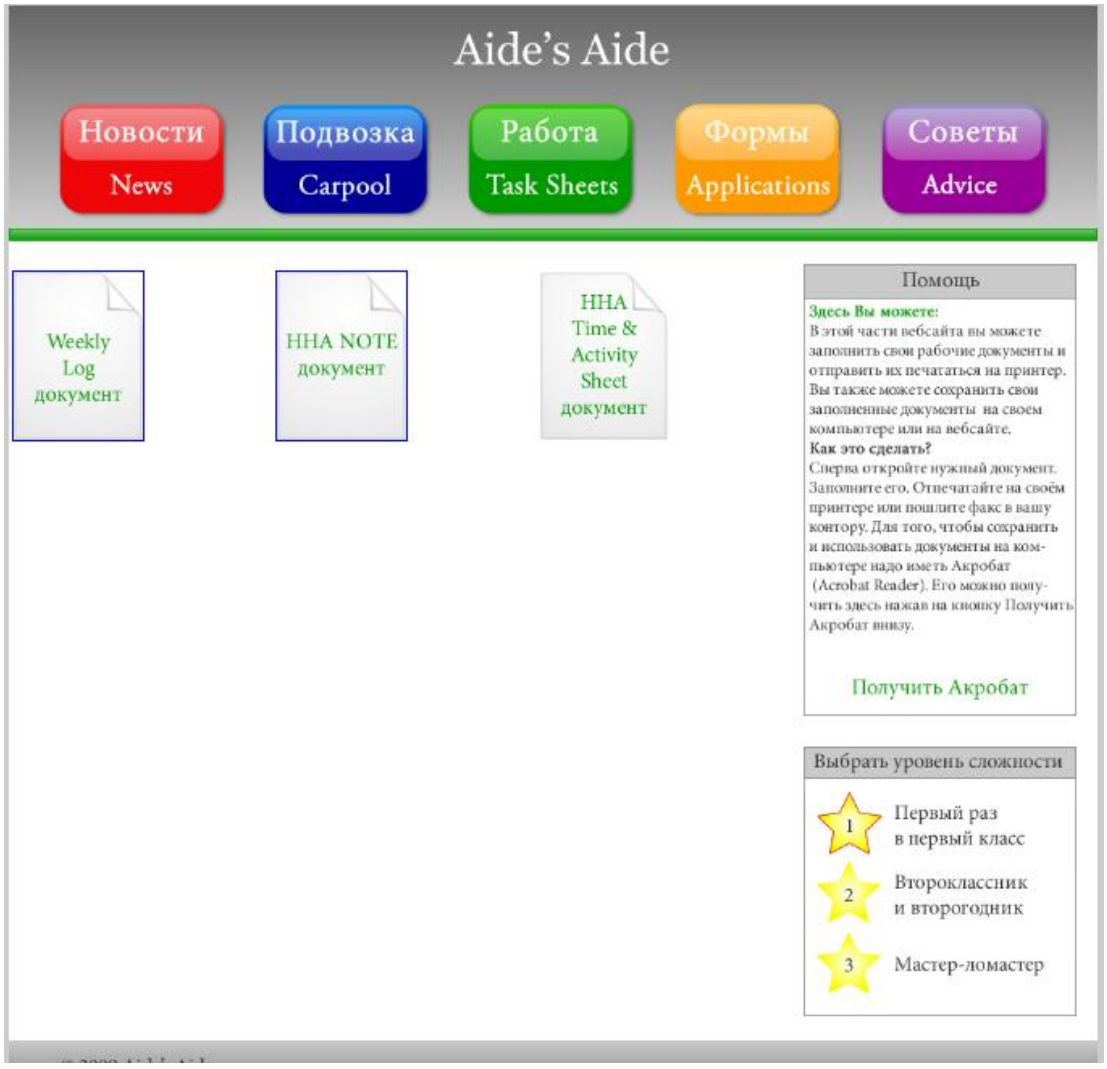

Figure 12: Task Sheets Page

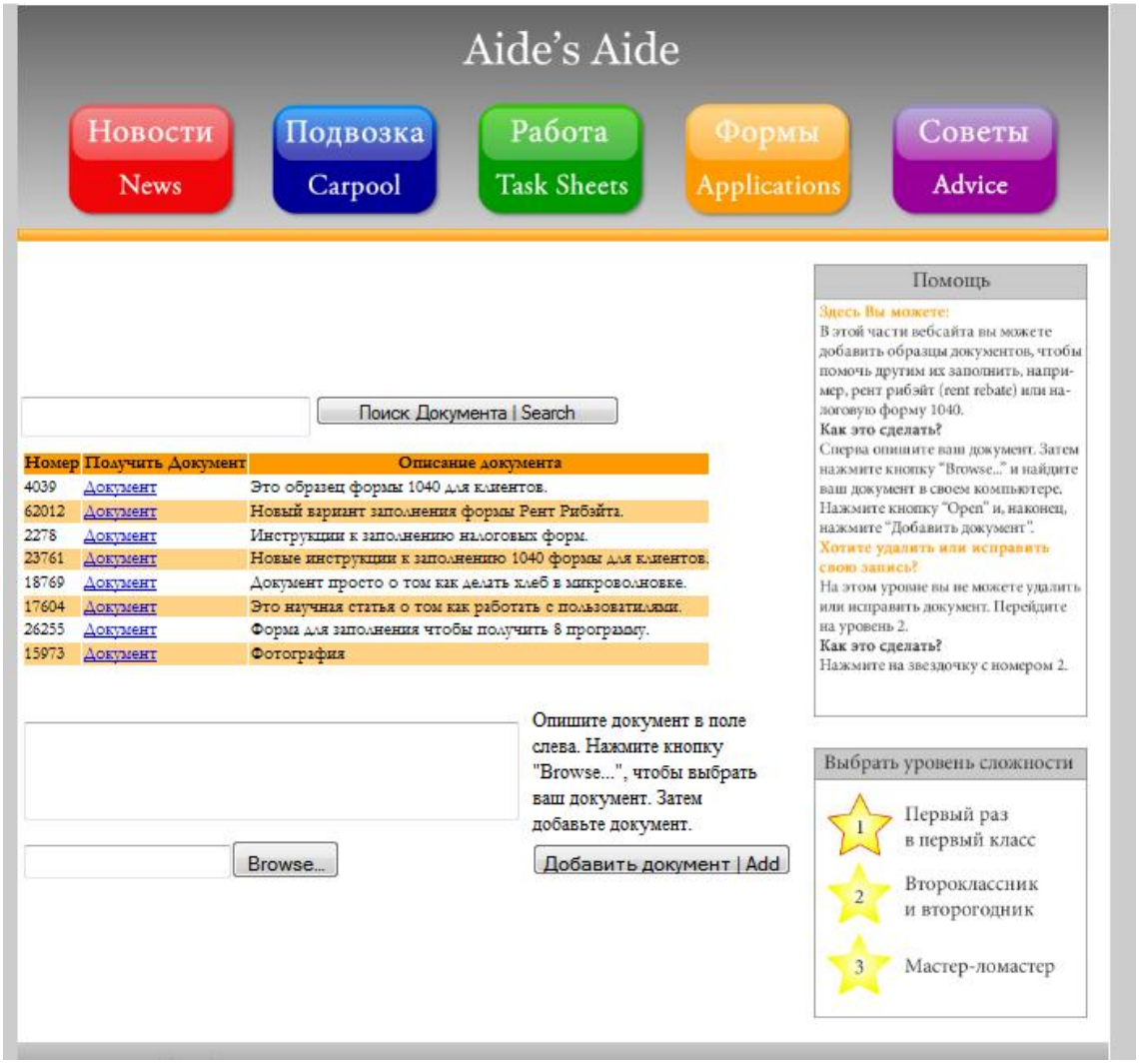

Figure 13: Applications Page

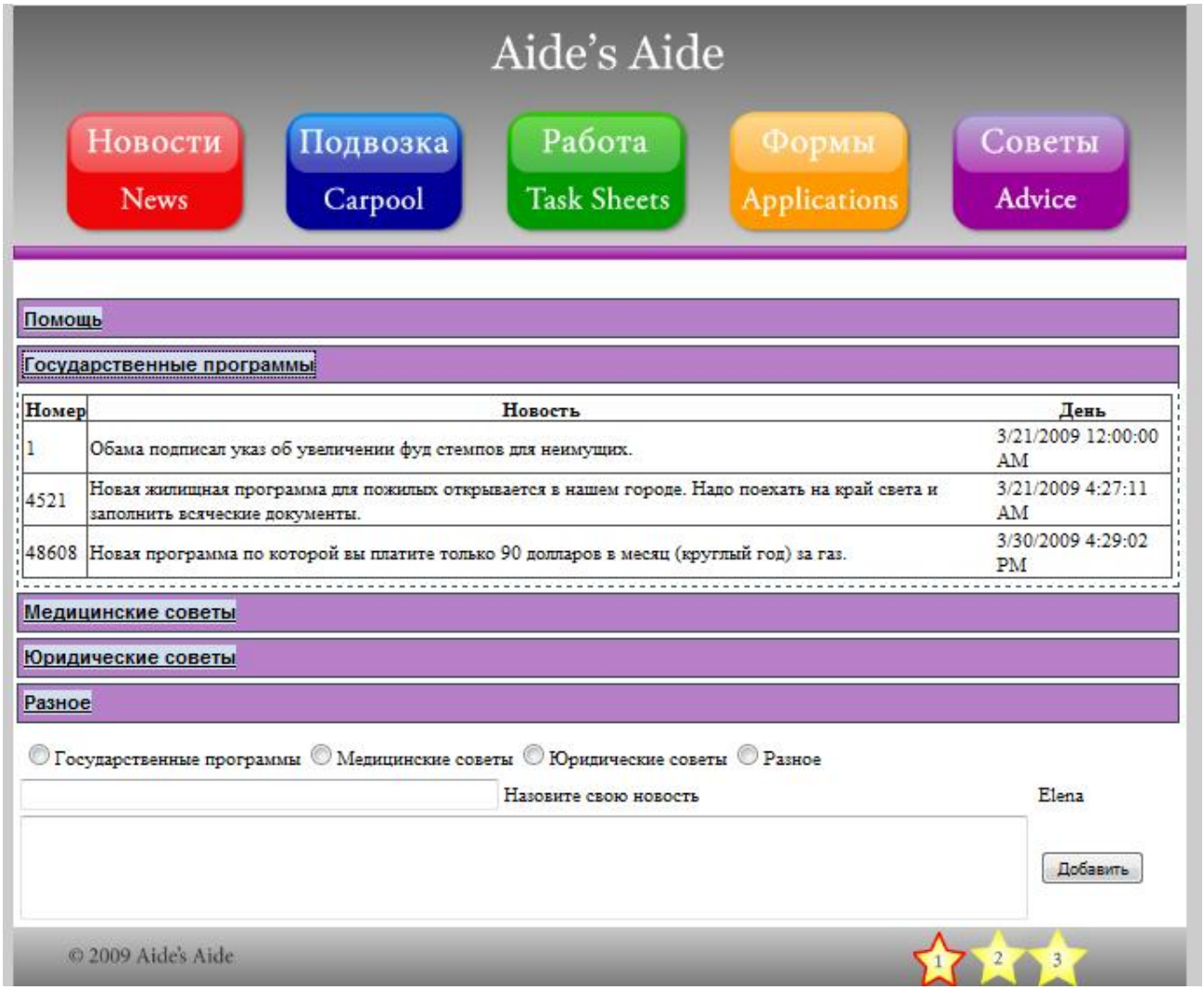

Figure 14: Advice Page