

## 6. Instrument Development Tools

A variety of methodologies and techniques are applied to the DL framework. Each has been specifically designed for DL usability and accessibility evaluations.

### 6.1 Questionnaires (See Appendix A)

Design decisions regarding the general scope and focus of the questionnaires had been made at an early stage in the project by carrying out:

- Research into the aims and design of the application.
- By identifying key usability questions we wanted answered.

A range of information gathering tools were further utilised to evaluate what data we wished to retrieve via the questionnaires, and how the questions could be best structured:

- Brainstorming sessions with the JISC team at City University.
- Analysis of the initial findings from walking through the application.
- Telephone and email correspondence with personnel from the four JISC services to uncover any particular areas they were interested in gaining feedback from.

The guidelines that were referred to in section 3.7 of this report were also applied to the structure of the questions, to ensure they followed standard design principles.

The questionnaire included the following types of questions to help ascertain a variety of information.

- **Factual questions** – to collect background information on end-users.
- **Opinion and satisfactory statements** – ask respondents to rate their views and attitudes as to whether they like something or not by way of a Likert scale.
- **Closed questions** – enable greater statistical analysis of data.
- **Open questions** – to elicit general and unanticipated information

The structure of all four questionnaires generally follows the standard design of the Questionnaire for User Interaction Satisfaction as designed by The University of Maryland (Shneiderman, 1998). They start with an explanation of the purpose of the questionnaire, then general factual questions asking the user background information. This is useful to find out the range of experience etc within the response group. They then ask opinion questions relating to specific usability criteria and features of the application.

Eighteen opinion questions were included in all four surveys based upon an established usability questionnaire, Computer System Usability Questionnaire by Lewis (1995). These general usability questions were selected because our research has shown that they clearly uncover key usability issues when applied to web-based services. The rest of the questions for each of the four services were devised by ourselves, and correspond to the specific design and nature of each of the services.

Each questionnaire contained no more than 40 separate questions; to include many more would have increased the possibility of:

1. Respondents being deterred from completing it due to the length & time involved.
2. Respondents switching off and replying at random after a while.

## **6.2 Focus Group (See Appendix B)**

Two different focus groups were held - concurrent and retrospective. The facilitators of the group ensured that all parties had a chance to express their opinions and that all the key points had been addressed by the end of the session. The 12 questions for the concurrent focus group directly address key areas of usability. Special emphasis was also given to the organisation of the content and whether the service assisted with task based information-seeking behaviour.

The retrospective focus groups were conducted after the user testing evaluations. The focus group questions were used to guide these sessions and were based upon the 10 impression questions that the users were asked to rate after completing their user testing. The semi-informal structure of this technique enabled the participants to develop their ideas as the session progressed, via the interaction with the rest of the group. Hence the participants expressed their opinions to a diverse range of usability issues.

### **6.3 User Testing (See Appendix C)**

Two different types of usability testing were conducted, formal and retrospective. It was important for both techniques that the group of users who participated in the tests matched the target user group of JISC services i.e.

- undergraduate/postgraduate students, librarians, researchers etc.
- experience of using web-sites to accomplish specific tasks

The test tasks were selected based upon common goals that users may wish to achieve throughout the areas of the site under evaluation, and focused upon the organisational structure of the information therein. When designing the test tasks, Nielsen's (1995) guidelines for choosing test task were also taken into account.

A standard consent form acknowledging the participant's co-operation to take part in the test and to be videotaped for evaluation purposes was devised. Additionally, a script to be read to all participants before the evaluation, outlining the nature of test, was produced.

Formal and retrospective user testing evaluations involve the recording of end-users' direct interaction with a system to collect both qualitative and quantitative data. However, the method by which this is obtained differs; hence coding sheets were specifically designed for each technique.

#### **Formal user testing**

Participants who had indicated that they were willing to take part were asked to complete a short questionnaire before being selected so we could ensure that we had a representative end user base. The questions referred to their occupation, Internet experience and the familiarity with the application.

The coding sheet was designed for the evaluator to write all comments upon whilst observing the user. For the purpose of analysis, it also enables the evaluator to specifically record whether the participant successfully completed the task; the time taken to accomplish the task (or before the test was stopped); the pathway that was followed; key errors that occurred and the users response

to subjective satisfaction questions (confidence, satisfaction and frustration). The coding sheet was divided into the following four phases:

1. **Demographics** – background information i.e. name, area of interest or study
2. **Free exploration** – 5 minutes for the participant to explore the application.
3. **Tasks** – five core tasks for the user to attempt
4. **Debriefing and impressions** – semi-structured interview questions

The mandatory interview questions in phase 4 were designed to further elicit the participant's views regarding the application's usability. A funnel approach was adopted whereby general questions at the beginning led to more specific ones later in the interview. The coding scripts allowed for additional questions to be recorded as a result of the previous answer, or in response to an action or problem that the participant encountered during the observational part of the user testing evaluation.

The formal user testing coding sheet was also modified for a selection of formal accessibility evaluations that were conducted.

1. **Demographics** – background information i.e. name, area of interest or study
2. **Internet skills and practice** – background information regarding the user's experience with the Internet
3. **Free exploration** – 5 minutes for the participant to explore the application.
4. **Tasks** – two core tasks for the user to attempt
5. **Debriefing and impressions** – semi-structured interview questions

The inclusion of phase 2 (Internet skills and practice) enables an evaluator to assess how experienced the participant is with the Internet, what sites they generally use and problems they currently experience. The interview questions were the same as for the formal user testing evaluations, with additional unstructured questions added to address accessibility issues when required.

## **Retrospective user testing**

As with the formal user testing evaluations, the coding sheet for the retrospective evaluations was divided into four sections:

1. **Demographics** – background information including experience with the Internet and application
2. **Free exploration** – 5 minutes for the participant to explore the application.
3. **Tasks** – five core tasks for the user to attempt
4. **Impressions** – 10 questions requiring a subjective satisfaction rating of between one and seven in relation to usability issues

The coding sheet was designed so that the participants could personally write down any issues they uncovered and answer the subjective satisfaction questions at the end of each task and in phase 4 themselves.

The impression questions for phase 4 derived out of the key areas of design and appropriate DL usability issues. As previously mentioned, task oriented information-seeking behaviour and highly organised contents are key dimensions of a DL. Therefore these questions are designed with these factors in mind.

## **6.4 Heuristics Evaluation (See Appendix D)**

In the heuristic evaluation, a set of web usability guidelines derived from the principles of Nielsen 10 heuristics was adopted to evaluate each individual web-based application.

The set of guidelines were divided in nine categories with a set of specific prompts that relate directly to web-based DL evaluations, thus assisting the evaluator in the heuristic evaluation to identify potential usability and accessibility problems.

The nine categories were:

- Navigation and Information Architecture
- Consistency and Standards
- User Control

- Readability and Ease of Learning
- Aesthetic, graphic design and branding
- Language
- Help and Documentation
- Error Prevention and Presentation
- Technology

### **6.5 Personas and Scenarios (See Appendix E)**

Personas and scenarios were created simulating the actual scenarios of current and prospective users of the JISC web-based application. These were done by describing how specific individuals in specific circumstances would use the JISC web-based applications. The personas and scenarios made assumptions about who the existing, potential or target users were and what kind of experience and knowledge they had. Each profile consists of three parts: a persona (a profile of the user), a photo of the user and a scenario that matches the specific needs of the user.

#### **Personas**

For each persona we gave the person a name and described their demographics: age, occupation, gender, education, hobbies, disabilities and level of computer skills.

#### **Scenarios (specific to the service being investigated)**

Each scenario was created based on the daily tasks of the user, when he/she uses his/her computer, the purpose of using the computer and Internet. Most importantly, identify what he/she does with the JISC web-based application and the importance of it and how this could help in accomplishing his/her task more effectively by using the web-based application provided by JISC. This part of the scenario addressed the user's motivations, and real-life problems that determined their priorities. The common scenarios created were focused upon task-oriented behaviour and required a high level of information organisation.

### **6.6 Cognitive Walkthrough (See Appendix F)**

Before conducting the cognitive walkthrough, we took the scenarios and personas created into account. The scenarios created were adopted as the primary tasks that represented tasks which most users would be doing when using the JISC web-based application.

A set of templates based on the CE+ theory (Wharton et al, 1994) which is an information-processing model of human cognition that describes human-computer interaction in terms of four steps:

- 1) The user sets a goal to be accomplished with the system (for example, "check spelling of this document").
- 2) The user searches the interface for currently available actions (menu items, buttons, command-line inputs, etc.).
- 3) The user selects the action that seems likely to make progress toward the goal.
- 4) The user performs the selected action and evaluates the system's feedback for evidence that progress is being made toward the current goal.

The set of templates were designed in a way that the usability experts could then simulate the roles of each person's profile created in the persona and scenarios. The simulation aimed to simulate the actual users making sure that the site actually serves the needs of specific people in real life.