

Fostering User Experience in order to Improve the Quality of a Digital Library

Laurent Eilrich¹, Frederic Andres^{1,2}, Ghislain Sillaume¹, and Marianne Backes¹

1 CVCE, Chateau de Sanem,
L-4992 Sanem, Luxembourg
{laurent.eilrich, frederic.andres,ghislain.sillaume,marianne.backes}@cvce.lu
2 NII, Tokyo, 101-8430, Japan
andres@nii.ac.jp

Abstract. We present our approach to the redesign of a Digital Library (DL) related to the history of European integration (called European NAvigator, ENA). For the next version of this DL (ENA 2010), special attention has been paid to improving the user experience. We consulted with DL user communities before starting the redesign and obtained a list of users' expectations and needs regarding the DL. Although some expectations and needs could be met by putting certain functionalities on the screen; others were more difficult to meet because they went beyond the expected role of a DL, which is to facilitate access to objects of information and offer a collection of services to users. Our study demonstrated the utility of conducting a users' study in the preliminary phases of a DL project. Such a user-centered design approach enables users' perspectives to be incorporated into the DL.

Keywords: Digital Library, ENA 2010, User Experience, Usability, User-Centered Design Approach.

How to foster User Experience in ENA ?

The digital revolution has been the impetus for a lot of work on digital libraries. Over the last fifteen years, there have been theoretical studies on digital libraries [5], and digital libraries have grown up thanks to technological innovations of IT specialists. In particular, one library, called European NAvigator¹, has evolved from a CD-Rom into a multimedia Internet application through a client/server application broadcasted by satellite. The evolution of this library reflects a succession of technical opportunities [6]. Leiner [12] defines a DL to be a collection of services and information objects that support users in dealing with information objects by organizing and presenting them directly or indirectly via electronic/digital means. ENA is a DL that provides high-quality research and educational materials about the history of European governmental and social integration. It is a multilingual, multi-source, and multimedia knowledge base that contains more than 15,000 documents about the historical and institutional development of a united Europe from 1945 to the present day. Students, teachers, researchers, and anyone interested in the history of European integration can find original materials including photos, audio, video clips, press articles, and cartoons, together with explanatory synopses, tables, interactive maps, and diagrams. Each ENA material has been selected and scrutinized by a

¹ ENA: www.ena.lu

multidisciplinary team of specialists in European integration. Specialists select relevant sources from a large variety of documentary sources (e.g. publishing houses, periodicals, historical archives, organizations, public institutions, and other bodies) and apply strict selection criteria to ensure the quality of each ENA information object. Its documents form a part of the European heritage. Furthermore, it contains many supplementary materials, e.g., rare, unpublished, and difficult-to-access materials, relevant to the theme of European integration. These materials illustrate how and why Europeans have banded together within this union (or have chosen to reject it). ENA takes into account current research issues, especially historiographic methodologies. For example, the choice of materials included in the European Organizations section is based on precise criteria, e.g. legal instruments and learned articles.

The goal of our project has been to take this reliable knowledge base on the history of European integration and create a new version called ENA 2010 that will provide its user communities with convenient and useful web 2.0 technologies.

Fuhr et al. [8] believe that the starting points of designing a DL are determining its intended usage and corresponding user needs. Mahlke [14] shows that research into user's needs, etc., is valuable for defining the product. Like Fuhr et al., he believes that identifying the users' needs is a starting point to developing an innovative system. Beringer and Holtzblatt [2] emphasize the necessity to clarify the objectives of user research. Xie [17] pointed out that incorporating users' perspectives into the development of digital libraries requires the users' perceived importance of the DL evaluation criteria, knowledge of how they use digital libraries, and their evaluations of digital libraries, as well as their preferences, experience, and knowledge structures. Xie also stresses the importance of different evaluation criteria for different categories of users: i.e., users, researchers and professionals. Lettl et al. [13] noted that certain categories of users contribute more to the development of radical innovations.

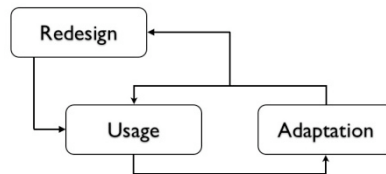


Figure 1: Usage-adaptation-redesign cycle

We should learn the users' needs and how they use a DL. Brangier [3] proposes the usage-adaptation-re-engineering cycle (see Figure 1), which highlights how human adaptations (of the users) are a source of innovation to design new uses. This idea of design is related to the question of use, which requires the existence of a DL or a prototype. The concept of innovation from current use is also discussed by Dix [7], who suggests the appropriation concept as a source for innovation in interactive system design. An appropriation exists when an object is used in another way that the way the designer has imagined. The models suggested by Brangier [3] and Dix [7] lead us to look at actual use cases in order to define users' needs precisely.

In the following, we will focus on the utility of a users' study in the preliminary phases of a DL project. To develop the next version of the DL, we decided to study

user communities as a first step in a user-centered design approach study. After that, we focused on DL usability. Indeed, since usability is an essential asset for any product [14], we knew that the success of the next DL depends not only on its technical qualities, its design, and its robustness, but also on its usability. Jeng [9][10] supports this idea by proposing an evaluation model of usability based the original criteria of the standard ISO 9241: Effectiveness, Efficiency, Satisfaction, and Learnability. This evaluation model of usability requires a use and thus the existence of a DL or a prototype. The model for the evaluation of the usability of the systems of digital libraries has been revisited by Tsakonas and Papatheodorou [16]. They showed that usability and usefulness are the two major criteria to evaluate DLs. These two criteria are essential to create an overall positive user experience. Hence, we decided to focus on usability during the DL development process by evaluating the usability of each prototype of ENA 2010. The ENA user communities' study was conducted by Brangier, Dinet, and Eilrich [4] and with the support of the ETIC² laboratory (User Experience Laboratory).

The first phase consisted of determining the conditions of use and the technological and informational profiles of the potential users. We identified communities of users likely to use our DL. We defined fourteen communities of practice involved in the European Integration Process. These included communities of researchers/historians, lawyers, professionals in documentation, journalists, teachers, international teachers, students, PhD students, software ergonomists, politicians, computer engineers, experts in intercultural studies, experts in new digital leisure, and members of historical associations.

The second phase consisted in an evaluation of DL usability by using the classical ergonomic criteria of Bastien and Scapin [1]. The third phase was an analysis of user requirements and an investigation of DL uses. We met with members of each community during 14 video-recorded focus groups. Each idea expressed by the groups concerning a need or a use could be listed. Altogether, 53 new ideations were identified. After classifying them, we realized that some could be supported by putting functionalities on the screen, whereas others were too complex because they went beyond the original role of a DL, which is to facilitate the access to objects of information and offer a collection of services to the users. Indeed, the idea of *having a direct phone contact* was expressed by a group of journalists. We noticed that a specific user need is hard to fulfill because it involves creating a new job in the DL, in order to take care of users. Xie [17] made similar observations, and some users suggested as DL evaluation criterion the unique services offered by Kim's model [11]. It gave precise details related to this topic in relationship with ours: DL qualities affect user satisfaction, DL use, and organizational impact.

The DL user communities' study gave us a clear vision about our users' needs. It was a good starting point to create a user-centered DL. Furthermore, we suppose that each functionality affects usefulness and usability and that it is necessary to appreciate these elements in an objective way by using the usability model proposed by Jeng [9]. The various services will have to conform to users' expectations. A clear model of a user-centered digital library design will have to support its own evolution in order to provide a positive user experience.

² ETIC : Equipe Transdisciplinaire d'Interaction et de Cognition

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