

Fostering User Experience Quality Improvement in Digital Library

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Abstract. The aim of this paper is to present our approach for the redesign of a thematic Digital Library (DL) related specifically to the history of European integration (called European NAVigator, ENA). For the next version of this DL (called ENA 2010), special attention has been paid to DL user experience. Our approach for the redesign has been based on consulting DL user's communities before starting the practical design of the next DL. The DL user's communities study permitted to obtain a list of users' expectations and needs towards the DL. We made the observation that if some users' expectations and needs would be possibly solved by functionality on the screen; other users' expectations and needs are much more complex to meet because they go beyond the original role expected from a DL which is to facilitate the access to objects of information and offer a collection of services to the users. The results demonstrated the interest of achieving a DL users study in the preliminary phases of a DL project. Through this user-centered design approach, it has been possible to incorporate users' perspectives into the development of our thematic DL. Ultimately, it enables to better match users' expectations and needs and to promote user experience.

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

Extended Abstract

In the last fifteen years, a very important work has been conducted on Digital Libraries through different projects linked to the digital revolution and massive digitization plans. Many initiatives all over the world aim at proposing documentary environments over the Web. These Digital Libraries have been mainly set up, thanks to the quick change of the technological solutions suggested by the IT architects. Along this evolution, the thematic library ENA has evolved from a CD-Rom to a multimedia Internet Application through a client/server application broadcasted by satellite. The evolution process of the library was a succession of steps triggered by technical opportunities [6]. In parallel, the first results of theoretical studies on the Digital Libraries foundation [5] started to appear and Leiner [13] proposed the following definition of a DL:

"The digital library can be defined as:

- [The collection of services](#)
- [And the collection of information objects](#)
- [That support users in dealing with information objects](#)
- [And the organization and presentation of those objects](#)
- [Available directly or indirectly](#)
- [Via electronic/digital means.](#)

This definition suggests that a DL must facilitate the access to objects of information and offer a collection of services to the users. Although corresponding to the definition proposed by Leiner [13], we noticed that ENA is

specific because of the selection of information objects it offers its users. It provides high quality research and educational material about the history of European integration process. 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. In this knowledge base, users as pupils and students, teachers, researchers, and anyone interested in the European integration process can find original material such as photos, audio and video clips, press articles and cartoons, together with explanatory synopses, tables and interactive maps and diagrams. Each ENA's material has been selected, created, processed and validated by a multidisciplinary team of specialists in European integration. Specialists scrupulously select the documentary sources for the creation of content from many and various sources (e.g. publishing houses, periodicals, historical archives, organisations, public institutions and other bodies). Selection criteria ensure the quality of each ENA information object. The ENA knowledge base is regularly updated and includes a body of wide-ranging and varied material. The content has been collected, grouped and organised after close critical scrutiny. Whilst more than a compilation or an anthology in the strict sense of the term, and without claiming to be exhaustive, ENA has been providing a selection from sources which, by their close connection to the editorial content, most clearly represent the events, individuals and institutions involved. This material comes from a collection that is historically objective and neutral, continually renewed and updated and constitutes the fundamental documents that constitute milestones in the history of Europe as it has progressed towards integration since the end of the Second World War. Such documents have been selected in particular because they form a part of the European heritage. These fundamental texts have then been supplemented by the inclusion of material which is more unusual, unpublished or difficult to access, and which is relevant to all the themes linked to European integration. The material selected illustrates how and why Europeans have banded together within this union or have chosen to reject it.

In parallel, current research issues are also considered, with the accent being placed on recent historiographic methodology. The material selected is closely linked to the subjects concerned.

In the specific case of creating the European Organisations section, the choice of material is based on very precise criteria (e.g. legal instruments, learned articles, etc.). The organisations are presented both in the light of the law currently in force and from a historical perspective, thereby demonstrating how they have developed since their earliest days. This original approach brings real added value to the ENA knowledge base.

Since ENA's principal aim is educational, the content has been selected with a view for presenting the key elements and shedding light on the most controversial issues concerning Europe. Apart from the synopses, documents such as maps, diagrams and tables are created according to criteria which are principally educational. Other documents are chosen more with a view to illustrating issues specific to the European integration process. All documents are presented either in their entirety or in the form of long extracts. Where no official translation exists, the translation has been undertaken by the CVCE. Whilst emphasizing the historical and/or institutional aspect of the process of European integration, they ensure that as many areas as possible - sectoral, ideological, geographical and linguistic - are represented. This step of creating a reliable base of knowledge on the subject of the history of European integration, offers the opportunity for a new challenge: to provide a great user experience to its user's communities by using web 2.0 technologies. So, we need to redesign a new DL ENA (called ENA 2010).

Fuhr, Tsakonas, Aalberg, Agosti, Hansen, Kapidakis, Klas, Kovács, Landoni, Micsik, Papatheodorou, Peters and Sølvyberg [8] believe that when designing a DL the starting points are its intended usage and the corresponding user needs. Mahlke [15] shows that user research provide usable results for product definition. Indeed, he promotes the idea that user research to identify the users' needs is a starting point to develop an innovative system. To success in a project, Beringer and Holtzblatt [2] emphasizes the necessity to clarify from the outset the objectives of user research project. Xie [18] pointed out that incorporating users' perspectives into the development of digital libraries requires to integrate at once, users' perceived importance of DL evaluation criteria, their use of digital libraries, and their evaluation of digital libraries as well as their preferences, experience, and knowledge structures. Thereby, we decided to start the ENA 2010 project by consulting our DL

user's communities. Xie [18] also stresses the importance of referring to different categories of users as he defines as : users, researchers and professionnals. Indeed, each type of user has its own DL evaluation criteria. During their studies, Lettl, and Gemuenden Herstatt [14] have already noted that certain categories of users contribute more to the development of radical innovations. They argue that the innovation based on user need should be created from conduct the user selection process very diligently.

We should know use of the DL and the specific needs of the users. Furthermore Brangier [3] proposes the usage-adaptation-reconception cycle (see Figure 1) which highlights that the human adaptations (of the users) are a source of innovation to design new uses. This design is more precisely related to the question of use which also requires also the existence of a DL or at least a very advanced prototype.

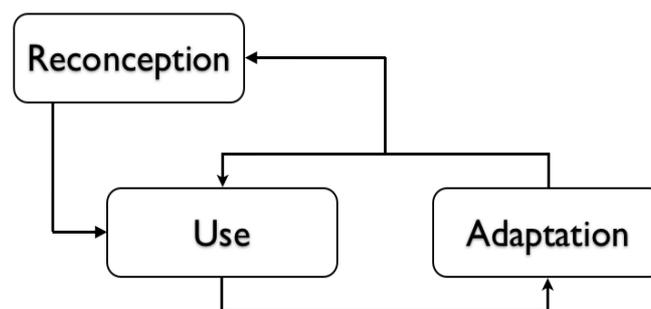


Figure 1: the usage-adaptation-reconception cycle

This innovation concept from current use was also showed by Dix [7] who suggested the appropriation concept as a source for innovation in interactive system design. The appropriation exists when an object is used in another way that the way the designer has imagined. These models suggested by Brangier [3] and Dix [7] rather lead us to look at actual use to define more precisely users' needs.

In the following, we will focus on the interest of achieving a DL users study in the preliminary phases of a DL project. For the development of the next version of the DL, we first decided to adopt an user-centered design approach by realizing a DL user's communities study. Second, we will focus on DL usability. Indeed, considering that usability is an unshakable asset for a product [16], we know that the success of the next DL depends not only on its technical quality, its design, its robustness, but also on its usability. Jeng [9][10][11] supports this idea by proposing an evaluation model of usability of the DL based the original criteria of the standard ISO 9241: Effectiveness, Efficiency, Satisfaction, and Learnability. This evaluation model of usability requires a use and thus as a preliminary existence of DL at least a very advanced prototype of the latter. The model of evaluation of the usability of the systems of Digital Libraries has been revisited by Tsakonas, G. & Papatheodorou [17] which has confirmed that usability and usefulness are the two major criteria to evaluate Digital Libraries. These two criteria are essential to create an overall positive user experience with a DL. So, we decided to focus on usability during DL development process by evaluating usability of each prototype of ENA 2010. The DL ENA user's communities study was conducted by Brangier, Dinet, Eilrich [4] and the support of the ETIC laboratory (User Experience Lab).

The first phase has consisted in determining the condition of use and the technological and informational profiles of the potential users. We identified communities of users likely to use our DL. 14 communities of practice involved in the uses of our DL on the European Integration Process were defined. It includes communities of researchers/historians, lawyers, professionals in documentation, journalists, teachers, cross-country race-farming teachers, students, PhD students, software ergonomists, politicians, computer engineers, experts in intercultural studies, experts in new digital leisure, and members off historical associations.

The second phase consisted in an evaluation of DL usability by using classical ergonomic criteria from Bastien and Scapin [1]. The third phase was an analysis of users' requirements and an investigation of uses of DL systems. It was carried out by meeting 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 news ideations were identified. By classifying these ideations, we realized that some of them could be solved by functionalities on the screen, whereas other ideations are much more complex to meet because they go beyond the original role expected from a DL which is to facilitate the access to objects of information and offer a collection of services to the users. Indeed, for example, the idea of "having a direct phone contact" was expressed by the group of journalists. We noticed that specific user need is hard to fulfil because it involves to create a new job in the DL, in order to take care of users. Xie [18] made some similar observations, some users suggested as DL evaluation criterion : unique services offered by DL. Kim with his model [12] gave precise details related to this topic in line up with ours; DL qualities affect user satisfaction, DL use and influence organizational impact.

This DL user's communities study allowed us to obtain a clear vision about user's needs. This gave a good starting point to create a user-centered DL, as an enhancement of the current ENA DL. Then a list of priorities regarding the users' requirements has been established in order to set up three phases of ENA 2010: ENA 1, ENA 2, ENA 3. Each phase has an interactive cycle in order to assess the matching between the user requirements and the current implementation of the ENA system. Furthermore, we can presuppose that each functionality will affect the DL usefulness and usability and that it will be necessary to appreciate these elements in an objective way by using the usability model proposed by Dr. Jeng [9].

The various offers (e.g. Web 3.0 based DL services) will have in the future to rely on the recommendations of the users to stick as much as possible to their expectations. A clear model of user-centered Digital Library design will have to support the various evolutions of the DLs to carry out the creation of an overall positive user experience.

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