Web 2.0 Persona-Based Digital Library Interaction Interface Design

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Abstract

As a research orientation grounded in market research, industrial design, and human-computer interaction (HCI), personas represent an approach to practicing user-centered design (UCD). In an empirical study encompassing literature review, statistical analysis, and interface design, four personas based on Web2.0 user behaviors were created at the Graduate School of the Chinese Academy of Sciences, and the integration of digital library service models with their behavioral patterns is discussed. Finally, advanced methods for these personas are proposed.

Full Text

Designing Digital Library Interfaces Based on Web2.0 Personas

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Abstract: As a research approach grounded in market research, industrial design, and human-computer interaction (HCI), personas represent a practical method for implementing user-centered design (UCD). Following an empirical study encompassing literature review, statistical analysis, and interface design, this paper develops four Web2.0 user behavior-based personas within the Graduate School of the Chinese Academy of Sciences and discusses how to integrate digital library service models with these behavioral patterns. Finally, advanced methods for persona research are proposed.

Keywords: Web2.0; personas; human-computer interaction; user behavior; user-centered design

2.1 Web2.0 Related Research

Under the Web1.0 paradigm, website design traditionally treated service recipients as components of the computing system—end users. However, Web2.0 fundamentally reverses this perspective. As Ian Davis (2005) vividly articulated, "Web1.0 was about catching information for people, while Web2.0 is about catching people for information" [2]. This shift necessitates that website designers recognize service recipients as individuals (Persons), making persona development the optimal approach for 2.0-style services.

In response to Web2.0 developments, the library and information science community has proposed the Library2.0 concept, which posits that the Web2.0 ideals of information co-construction, sharing, and co-creation can be achieved through user self-organization, self-creation, and self-connection. This user-centered design (UCD) philosophy is built upon foundational user research. As Academician Zhang Bo of the Chinese Academy of Sciences notes: "When engineers design a product, they first consider its functionality rather than user experience···In fact, humans are the creators and designers of products, as well as their ultimate users. 'People' should be the focus of attention" [1]. Emerging knowledge services require not merely categorizing users by behavioral habits, but achieving deeper understanding—a need that personas can fulfill.

The Web2.0 trend of abandoning technology myth in favor of humanity-centered design is increasingly evident. Luke Tredinnick (2006) argues that Web2.0 is not a technological innovation but rather represents a different understanding of information, knowledge, and users [3]. Such perspectives demand not only the application of Web2.0 technologies but also knowledge of which services users expect and which they do not. As Cooper states: "Meeting expectations builds brands, helps increase prices, improves customer loyalty, and gives products longer, stronger life cycles. This not only reduces costs but also greatly aids quality improvement" [4]. The critique of treating service recipients as a monolithic "Mass" with no choice but to accept excessive services is addressed by personas, which instead conceptualize service recipients as distinct groups of people (Persons) with clear characteristics and different needs. This approach transforms service models into new forms that both save investment and accurately target the market (the served user group), while promptly providing needed services during interaction.

2.2 Persona Development and Application

2.2.1 User Research Before System Development Personas provide comprehensive recommendations for business strategy, marketing communication, website construction, and embedded driver program development through the integration of quantitative and qualitative research [5]. In Web2.0 applications, Ajax technology is key to achieving 2.0 functionality for websites. The interaction interface design framework referenced in this study is Jesse James Garrett' s proposed design framework comprising the strategy plane, scope plane, struc-

ture plane, skeleton plane, and surface plane [14].

Beyond interface design, personas have been widely applied in various contexts. Alissa Nicole Antle (2006) developed adult and child personas for designing human-computer interaction (HCI) interfaces, distinguishing between information presentation methods and content delivery [6]. Ljungblad, S. et al. (2006) created four personas to design robots for daily human needs, investigating personal embodied agents, participation patterns, rules, and behaviors to develop models for robots that assist human daily activities [7]. The widespread adoption of personas stems from their ability, as Jianming Dong et al. (2007) argue, to enhance product usability by understanding user attitudes, behaviors, and needs [8]. Knowledge of user habits and preferences is essential for good interaction design. Building on UCD research, personas refine the service process and broaden design thinking.

2.2.2 System Development and Upgrading Successful post-development applications include Stefanie Panke et al. (2007), who used personas to evaluate e-learning systems and obtained empirical evidence of increased user participation. Their study demonstrated that personas enable designers to see beyond the design itself to users' other life contexts, providing images, stories, and different styles that foster creative thinking and more accurate design of service functions and models that meet target users' ideals [9]. Another case is Stephen P. Capps et al. (2006), who designed multiple personas for mobile devices, considering the need for migration functions from persona to persona due to the characteristics of mobile devices [10]. This new thinking confirms that personas are not about studying fixed individuals but about researching human behaviors to synthesize several fictional persons.

2.2.3 Applying Personas in Academic Environments Dhaval Vyas et al. (2006) employed "situational research methods" to apply anthropological research to user modeling in system design, considering respondents' education levels and professional categories [11]. Jukka Haikara et al. (2007) discussed how personas promote interaction design and usability [12]. Because personas emphasize building research findings on empirical studies, they have gained attention in both industry and academia. Applying personas to digital library embedded service models is both feasible and forward-looking.

4 Research Results

4.1 Data Analysis Results The data analysis results are presented in Table 1 , which shows a contingency table of Web2.0 behaviors by gender and age.

4.2 Web2.0 Persona Development The Web2.0 personas are developed as shown in Table 2 , categorizing users by their utilization of instant messaging, P2P, content aggregation, and social bookmarking.

4.3 Interaction Interface Design Based on Personas The interaction interface design based on personas is illustrated in Table 3 , which outlines 2.0-style service design across different strategic layers including self-expression space, communication space, content integrity, rapid task completion, personalized communication, mass communication, mass content, personalized search, and various functional pathways (communication→transmission, communication→search, search→communication, search→transmission).

5.1 Overall Web2.0 Persona Situation

Based on a questionnaire survey of graduate students at the Chinese Academy of Sciences (with related data published in *Library and Information Service* No. 9, 2007) [13], the transformed data was analyzed using contingency tables. The survey revealed that Chinese Academy of Sciences graduate students use social software with "high entertainment value, low work value" characteristics: (1) Mobile learning (M-Learning) may become the next generation platform; (2) Although instant messaging (IM) is widespread, it is used more for sharing feelings than for standardized work discussions, involving emotional communication rather than simple bidirectional transmission; (3) P2P usage is also extensive, but downloading entertainment content far exceeds work documents or software tools; (4) While blogs are platforms for in-depth communication, users primarily engage in informal casual conversation; (5) RSS usage rates are higher for receiving standardized article content; (6) Few people use social bookmarking, and usage does not necessarily indicate willingness to contribute.

5.2 Service Design for Type A Personas

Type A personas exhibit the highest blog usage compared to other types. When serving these users, it is important to note that their problem definitions may change during the Q&A process. After achieving a certain level of familiarity and understanding, the probability of successfully providing high-quality services (i.e., recommending other relevant service functions) to these users is relatively high.

5.3 Service Design for Type B Personas

Type B personas show the lowest P2P usage among all types. Rapid transmission functions may not be needed by these users, and related services need not be particularly emphasized or recommended. Additionally, discussions in public network spaces such as BBS may be more popular among these users than personal blogs, making it easier to locate these users in the "Academy Starry Sky BBS."

5.5 Service Design for Type D Personas

Type D personas exhibit the greatest variation in usage across the five social software tools. Their primary preference may be for immediacy and rapid transmis-

sion. Simplified operations and convenient searches are particularly welcomed. Unlike Type A personas, Type D personas clearly know what information or services they need.

5.6 Discussion of Literature Review

Achieving the full Web2.0 ideal of information self-organization, self-creation, self-connection, and resource co-construction, sharing, and co-creation still appears to have some distance to go. The persona method enables deep understanding of what users think, need, and want through five aspects: their thoughts about the brand, their functional requirements, their habits regarding search paths, their habits and requirements for interaction and navigation, and their aesthetic requirements.

6.2 Research Limitations

First, like other user research methods, personas are not a panacea. Currently, they are widely applied to website interaction interfaces but have limited reference value for more in-depth embedded systems, behavior-driven systems, and intelligent agents. Second, this experimental study relies on questionnaire data, an unavoidable limitation of social science research methods that may compromise the generalizability of conclusions due to the uniqueness of survey subjects. Further validation should be considered when generalizing the findings.

6.3 Future Research

Personas represent a user classification method that differs from traditional approaches by first considering users' overall online behaviors, then examining the specific behaviors, needs, and system requirements of each persona type, rather than classifying users directly by system functions. This research approach is still emerging and warrants in-depth investigation.

6.3.2 From Quantitative to Qualitative Approaches Two approaches can be adopted: (1) First classify users by social attributes (such as gender, education level, age, etc.), then verify using ANOVA; (2) First classify users by behavioral characteristics (such as Web2.0 applications), then conduct factor analysis and cluster users. The first approach considers user social attributes for classification followed by variance analysis validation; the second considers user behavioral features, conducting factor analysis before clustering users. This study only completed a simplified first stage, with the intention and purpose of testing the feasibility of establishing a preliminary framework.

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Note: Figure translations are in progress. See original paper for figures.