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Engineering and Evaluation of Community Support in useworld.net

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Abstract

Design objectives, support services and a development methodology for online communities by means of the case study portal "useworld.net" are presented. The development process that was used emphasizes interdisciplinary requirements analysis and usability testing. As a result special attention was paid to community building and to developing adaptive support which we call socialware. Evaluation results of first prototypes are reported.

1 Introduction

useworld.net is an open user adaptive scientific portal that integrates different information services with collaboration components (see Figure 1). It was jointly developed by a distributed interdisciplinary team at four German universities (Röse et al., 2002). Its purpose is to support information exchange and cooperation within the research area of human-machine-interaction (HMI).

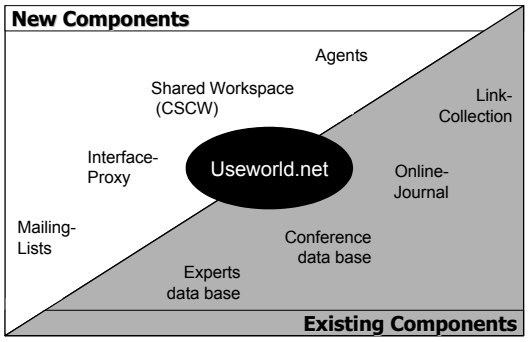

Figure 1: Components providing services in useworld.net

Together with an already existing electronic journal several other information sources are integrated into a browsable web-catalog: conference announcements, link list, job postings, pre-print server, literature references, mailing lists, and expert database. The catalogue and external content is made accessible through a search engine. A shared workspace component enables file-based cooperation in working groups (Künzer & Schmidt, 2002). Registered users can easily form new groups and invite other users into existing workspaces. The operational concept does not

include an editorial office (except for the journal) for supplying new content because as a non-profit organization there is no assured and stable way funding it. Thus we apply the idea from several successful online communities that all registered users can act as editors.

2 Community Support

Due to this concept we focused on three main objectives: quality assurance of content, online community building and mediating relevant information on changes to the users providing community awareness.

The community success relies on activity of its users. They only engage if they gain a benefit. Their avail is the content offered by other users so they have to accept it and thus have to trust the content. Quality assurance is central because every registered user is allowed to place new information in public readable sections of the portal. To introduce quality assurance we provide registered users the possibility to rate content. Ratings are used in the portal's catalogue to filter and sort listing views. Thus low rated content will not be displayed at a prominent place. Since the target group of useworld.net is interdisciplinary (psychologists, computer scientists, engineers, graphic designers) the interests and needs of portal users greatly differs. This results in heterogeneous content and ratings. To qualify other users' ratings we apply (user adaptive) relevance information inferred from different sources: use of same workspaces, profile information (in means of catalog categories), activities in the catalogue, and adoption of certain roles within the community.

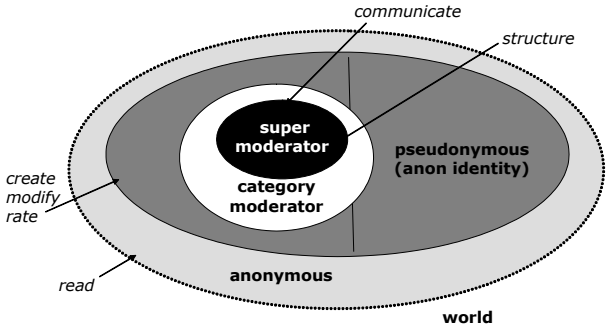

Figure 2: Roles users of the portal can play in the community

While the above objective aimed at consumption of the portals content special efforts had to be made to motivate users to act as content producers. Online community building is addressed by social functions: registered users may adopt moderator roles (see Figure 2); by design: rating is especially easy to fulfil and is graphically emphasized; by technical functions: an interface proxy permits for easy incorporation of new external web-information into the catalogue; by organization: privacy and security are important factors that we paid special attention to.

With useworld.net we offer a system for both direct cooperation in shared workspaces and for indirect cooperation through information sharing, discussing, and producing in the catalogue. An important community support for both is to enable change awareness implemented with agents that collect relevant information for its users and present it in e-mails and personalized portal pages. We adopt the term *socialware* from Hattori, Ohguro, Yokoo, Matsubara & Yoshida (1999) for this technology. Figure 3 shows the principle architecture of the socialware support in useworld.net: Users interact with the information services of the portal ("information and cooperation services"). These activities are monitored by the socialware layer of the portal. Since

the same information space of the portal is used by many users in parallel the activities of one users affects other users as well. Examples for such activities are inviting to work groups, cooperation on an object in a shared workspace, discussions, rating of elements in the information space, or creation of new elements. Some of the activities help the socialware layer to form a representation of single users and their interrelations (working groups, interest groups). This user profile information is used by agents to monitor all activities and filter information about changes relevant for single users or groups. Depending on personal settings the personal socialware-agent informs a user on a regular basis by e-mail.

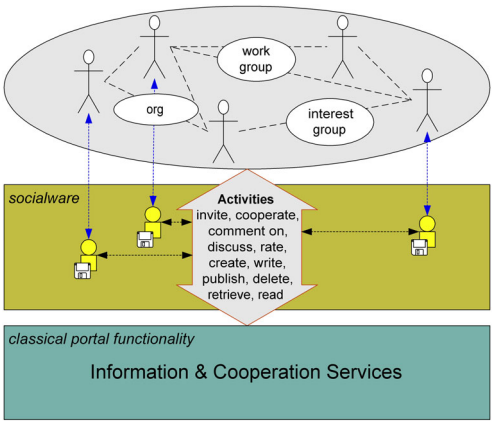

Figure 3: Socialware support in useworld.net through agent support

3 Engineering

Standard software engineering methodologies like the Rational Unified Process are not sufficient for developing innovative collaboration platforms that meet the needs of heterogeneous communities because this is not a straightforward engineering task. Instead this usability engineering problem can be addressed by applying the parallel-iterative engineering approach (PIE, see Figure 4). It suggests user participation in all phases. Technology developers work parallel to human factors specialists in defined phases: After first defining the system's boundaries (e.g. target group and objectives), in the second phase technical functions (features) on one hand and user needs, expectations and abilities on the other are collected to guide the design of function and interaction principles. The result is a specification of use cases and corresponding technical functions. The next parallel step is to implement the technical system and to develop interface designs and organizational embedding. This process phase is accompanied with formative evaluations of mockups and prototypes supporting design decisions in early phases of software development. Finally usability evaluation cycles help to optimize the software. This approach significantly reduces the risks of software development in innovative interaction oriented software projects. The systems engineering view on software development guides usability evaluation: Scenarios are defined on the basis of the use cases. Results are interpreted and weighted with objectives and target group in mind.

PIE defines a universal (macro) process. We have further structured its phases with the agile software engineering methodology "feature driven development" (Coad, Lefebvre & De Luca, 1999) because the notion of features is especially suited to communicate between technical and human factors staff and because features are an appropriate interface between the phases of the macro process.

This process was used to develop the useworld.net portal. During the planning phase a survey was conducted for the human factors side of the requirements analysis (Leuchter, Rothmund & Kindsmüller, 2002). Results showed that the proposed concept "users as editors" is critical. Especially the community building process had to be supported. Thus Kindsmüller, Razi, Leuchter & Urbas (2002) focused a further study on community aspects and user motivation to prepare the design of useworld.net.

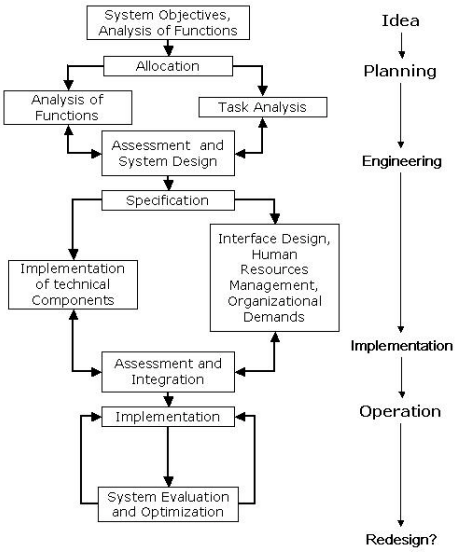

Figure 4: Development process for interactive systems with parallel-iterative engineering (PIE)

4 Evaluation

The first evaluation of the prototype was carried out with 20 subjects from mostly university background (engineers, computer scientists, psychologists). Some background information about the participants:

- *Computer experience/-usage in average:* 12 years, ca. 5 hours daily, mostly professional
- *Internet usage in average:* 6 years, ca. 2 hours daily, mostly professional
- *Search engines in average:* 5 years, ca. 20 minutes daily, mostly professional
- *Online-community-usage:* most less than 5 communities, mostly private

Typical use-situations were tested with a scenario-based-approach. E.g. the task: "Invite the member 'eva' into your workgroup and check the successful sending of your invitation to 'eva'". The participants of the evaluation were expected future user of the useworld.net, but not the same individuals as in the requirement analysis (Leuchter et al., 2002), therefore user on the novice level of useworld.net-usage. The evaluation situation was structured with a short pre-questionnaire about experiences with online-cooperation and internet-usage, followed by a scenario-based testing of selected usage-situations with useworld.net, followed by a post-questionnaire about subjective satisfaction with the usage of the system and finished by an open feedback discussion.
The items of the post-questionnaire were structured into two categories: 'joy of use' and 'ease of use' and provided a rating with five steps. In the remainder, some selected results of this evaluation are reported. Over all, the user-satisfaction was agreeable for a prototype. In total the median for 'joy of use' (used the hedonistic differential) was 3.45 and for 'ease of use' 3.07. These results are not bad but show a potential for redesign. Interesting is the higher score for 'joy of use'.

Finally the participants resumed the evaluation in a focus group feedback discussion:

- useworld.net is an innovative and interesting approach.
- The high degrees of freedom (especially in the CSCW-part) were accentuated.
- They missed a list with all names of useworld.net members.

All users emphasize the good correspondence of navigation (interaction design) between the catalogue- and the CSCW-area. The main actions in both areas were realized with drop-down menus (which include context-dependent main functions).

5 Conclusions

The parallel-iterative engineering development process proved to be useful. Especially the feature-based fine planning scheme made communication in the interdisciplinary team effective. The requirements analysis was very important since it revealed the demand for community aspects consideration. This resulted in the community support for our interdisciplinary scientific target group as detailed above.
The usability test showed that participants were all pleased of the variety of the possibilities the community-portal offered for cooperation. In the scenario-based testing part 90% of all participants have executed the cooperative tasks successfully without any instructions. 77.7 % of the participants could see that other users are also active (logged in) in the community. The offer of global access (independent of location or used system) to the community was for all participants a really important aspect, in combination with the possibility to create the own 'internet-workplace' and a private 'sub-community' integrated in a comfortable portal-community.

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References

Coad, P., Lefebvre, E., & De Luca, J. (1999). *Java Modeling In Color With UML: Enterprise Components and Process*. Upper Saddle River, NJ, USA: Prentice Hall.

Hattori, F., Ohguro, T., Yokoo, M., Matsubara, S., & Yoshida, S. (1999). Socialware: Multiagent Systems for Supporting Network Communities. *Communication of the ACM*, 42 (3), 55-61,.

Kindsmüller, M.C., Razi, N., Leuchter, S., & Urbas, L. (2002). Zur Realisierung des Konzepts "Nutzer als Redakteure" für einen Online-Dienst zur Unterstützung der MMI-Forschung im deutschsprachigen Raum. [On the realization of the concept „users as editors" for an online-service supporting HMI research in German speaking countries] In GfA (Ed.), *Arbeitswissenschaft im Zeichen gesellschaftlicher Vielfalt. 48. Kongress der Gesellschaft für Arbeitswissenschaft* (pp. 133-137). Düsseldorf, Germany: GfA-Press.

Künzer, A., & Schmidt, L. (2002). An Open Framework for Shared Workspaces to Support Different Cooperation Tasks. In *Proceedings of World Wide Work, Work With Display Units, Berchtesgaden, Germany* (pp 217-219). Berlin, Germany: ERGONOMIC Institut für Arbeits- und Sozialforschung.

Leuchter, S., Rothmund, T., & Kindsmüller, M.C. (2002). Ergebnisse einer Tätigkeitsbefragung zur Vorbereitung der Entwicklung eines Web-Portals für Mensch-Maschine-Interaktion [Results of a task survey for preparation of the development of a web portal for human-machine-interaction]. In GfA (Ed.), *Arbeitswissenschaft im Zeichen gesellschaftlicher Vielfalt. 48. Kongress der Gesellschaft für Arbeitswissenschaft* (pp. 129-132). Düsseldorf, Germany: GfA-Press.

Röse, K., Urbas, L., Gersch, P., Noss, C., Künzer, A.,& Leuchter, S. (2002). Interdisciplinary Development of a Collaborative Portal for a Heterogeneous Scientific Community. In P. Isaias (Ed), *WWW/Internet 2002, Proceedings of the IADIS International Conference, Lisbon, Portugal, 13-15 November 2002* (pp. 385-392). Lisbon, Portugal: IADIS Press.