

Building a virtual professional community: the case of Bulgarian Optometry and Eye Optics

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Abstract— Knowledge management (KM) can support small and medium enterprises and individual professionals to access information and knowledge on recent developments and innovations in their field, and to share the best practices available. It is particularly important for the healthcare professional field where a lot of changes appear and professionals need to be aware of them in order to better help people. This paper presents a concept and a prototype of a web-based KM platform in support of the Bulgarian community of professionals in the field of Optometry and Eye Optics.

I. INTRODUCTION

In the knowledge-based economy, knowledge has become a key resource and an essential factor for ensuring high quality, efficiency and competitive advantages. The rapid development of science and technology has faced organizations with many challenges and the need to continuously monitor their environment, in particular, their clients' needs, competitors' behaviour and the regulatory amendments. Many small and medium enterprises (SMEs) face difficulties to develop on their own new knowledge and innovation, as well as to actively monitor the trends in their external environment [1]. Therefore, they are often supported by non-governmental organizations (NGOs), industrial associations, clusters, etc. for exchange of knowledge and best practices, and thus, building a collective intelligence. As noted in [2], the generation of innovation in SMEs is related to multilateral relationships – they collaborate with other SMEs, scientific communities and other organizations, from which they obtain up-to-date knowledge and expertise, share and discuss ideas. The development of information and communication technologies (ICT) provided to SMEs enormous opportunities to access information and knowledge, to enter various virtual communities – communities of practice (CoP), communities of interest (CoI), Communities of creation, Learning communities, etc. [1]. SMEs embeddings into virtual networks or communities gives them opportunities to take advantage of the open collaborative learning processes, and thus, to acquire new knowledge and competencies [2].

The problems faced by SMEs in the industry of Optometry and Eye Optics in Bulgaria for accessing knowledge are a reason for developing a collaborative platform to assist the interested individuals and organizations in sharing knowledge and expertise. The analysis of the needs of the community [3] suggests that a knowledge management system (KMS) could facilitate

the knowledge-sharing and the communication among all organizations in this industry, individual professionals and other interested stakeholders. On the other hand, having a virtual space for exchange of ideas and for building a common memory, could facilitate the process of learning of individual participants and the community as a whole.

The goal of this paper is to present a concept of a virtual platform for the purposes of the community in optics and optometry in Bulgaria. The paper initially presents the problems of the community, and later focuses on the concept and its implementation.

II. PROBLEMS IDENTIFIED

The professional community in the field of Optometry and Eye Optics in Bulgaria comprises individuals working as optometrists or opticians, SMEs (the majority are micro enterprises) operating in the field of ophthalmic optics, optical shop owners, manufacturers, importers of optical or contact lenses and spectacle frames, and suppliers of equipment and processing tools for glasses. Other essential stakeholders are educational institutions in the field, researchers and lecturers in universities and vocational secondary schools, as well as professional organizations and associations of optometrists and opticians.

The Eye Optics is a professional field closely linked to health care, and therefore, the level of knowledge of practitioners is of vital importance, not only for the professionals of this community, but also for the whole society. The professional performance of this industry strongly depends on the involvement of highly-qualified staff, able to learn on-the-job and to adapt to the trends in the sector, and the dynamic development of technologies. Its primary sources of knowledge include:

- sources of theoretical knowledge (know-what) - training programs at universities and vocational secondary schools, textbooks, educational materials, and research papers;
- sources of practical knowledge (know-how) - seminars and workshops organized by representatives of manufacturers, news articles, company guidelines and standards, cases and conference materials.

The challenges of life-long learning and sharing of best professional practices are facilitated presently by many international organizations in the field of Optometry and Eye Optics, however, the Bulgarian community is still not taking full advantage of these opportunities. There is also a need for a constant dialogue with educational institutions

for providing training according to the changing skills demands of the industry.

The analysis of the present state of the knowledge transfer in the industry shows serious obstacles [3]. On the one hand, no literature is available in Bulgarian, and on the other, a common archive of documents and materials needed by the community, including on Wikipedia, does not exist. The trainings are chaotic, organized mainly according to the interests of big companies in the field and not consistent with the professional qualifications and the real needs of the community. The access to information and knowledge from international events and conferences is quite difficult, mainly due to the lack of funding for participation. Much better is the opportunity to follow the innovations in the field by attending trade fairs.

In the virtual space certain gaps also exist. For example, the National Association of optometrists and opticians (NABOO) has made attempts to provide online fora for its members developing three websites, which unfortunately, were not professionally designed and contain a limited information about different periods. None of them provides to the community a platform for sharing of knowledge and information. The use of social network sites (SNS) gives temporary results. In a spontaneously created closed group on Facebook "Opticians and Optometrists" with presently over 500 members quite active are around 30 people, who share mainly news, and a small and fragmented data base that could be used as a basis for a future specialized platform. Generally, the knowledge sharing occurs with changing degree of active participation and is quite chaotic, unorganized and ineffective, despite the enthusiasm and efforts of some NABOO members.

One of the main problems in the industry is the lack of information 'who is who'. Statistics on the number of certified practitioners and opticians and official lists of organizations working in the field do not exist, as well as contact information of optics. While such information could facilitate the networking of the community, it could also be of importance for its visualization in the society. This is a reason to consider establishing a directory of 'yellow pages' which will support SMEs in the industry to find relevant expertise, and will facilitate the contacts with other stakeholders and end-users, in particular.

III. CONCEPT OF A COLLABORATIVE PLATFORM

A. Methodology

The methodology followed by the platform development team takes into account the life cycle of software systems development, and the problem solving life-cycle [4]. Initially, the main functionalities were determined on bases of a careful analysis of the state-of-the-art in the community, and the main needs in place. As a second step, the research literature was studied for identifying technologies supporting collaboration and knowledge sharing, as well as taking advantage of existing practice of virtual communities [1]. On this base were defined the main requirements of the platform, its services and technologies to be used. The pilot platform was designed and tested within a Bachelor Thesis [5], however, a lot remains for its validation within the community and its final exploitation.

B. Goals and services

The analysis of the status and the needs of the community in optics and optometry were a reason to consider developing a KMS. The main goal is to facilitate the knowledge sharing and the communication between organizations and professionals in the industry and other stakeholders, to enhance their cooperation and to support them to find knowledge and expertise. This would establish conditions for building a strong CoP as an informal network of people with shared values and beliefs in optics and optometry in Bulgaria.

As main users of the system were considered:

- opticians, optometrists and their organizations;
- teachers and students in the field of optometry and optics;
- members of partner organizations (European, global, industry and professional organizations in other countries and in Bulgaria);
- representatives of public bodies related to the industry;
- end-users of products and services.

According to the literature [1], [6], the virtual community could be supported by various technologies for knowledge sharing and collaboration (Fig. 1).

On bases of the overall goal of the KMS, as specific objectives were identified:

- (a) Building collective memory based on internal and external community knowledge (creation of shared specialized knowledge base);
- (b) Strengthening communication and collaboration.

The implementation of the first objective focuses on:

- providing information about legislation, regulation and performance requirements of the industry (online library, news);
- facilitating access to libraries with professional literature and educational materials;
- providing access to existing good practices and innovations in the industry;
- supporting expertise allocation and connection with experts in the field ("yellow pages");
- providing information on related organizations, educational and training programs, as well as on foreign experience to solve problems in the field.

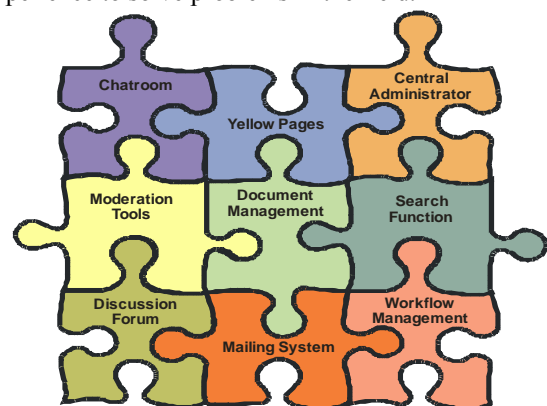


Figure 1. Components of the CoP platform [6]

In order to strengthen the communication and collaboration in the field, it is foreseen the following:

- establishing an environment for assistance and advice of community members on important regulatory, technical, financial, management and organizational aspects (help-desk system);
- facilitating discussions on common problems of the industry to develop common views, as well as for taking important joint decisions (closed discussion forum, online conferencing tools, etc.)
- providing various online communication channels with the external environment and for obtaining users' feedback (forum, groupware).

C. Technology

The goals and objectives set should be implemented by taking into account that the potential users have moderate ICT skills, and thus, the web platform should provide easy-to-use (in terms of access, content management, presentation, search and navigation) and intuitive interface, integrating, when possible, widely-used web applications and tools. This is essential in order to facilitate the platform uptake and not to discourage users. Other requirements include platform independent presentation of digital content (text, images, audio and video), both on mobile devices and desktop computers. It was, therefore, taken into account that present Web 2.0 technologies provide excellent tools for KMS:

- For exchange of expertise and experience in the industry can be used a wiki that makes it easy to create, organize, and search for knowledge coming from large groups of users. In practice, wiki pages can become an online branch encyclopedia.
- Social networks (e.g. Facebook, LinkedIn) can be used as a base for communication between members of the association and for integration of information "who is who", including professional contacts and expertise.
- A discussion forum can be used to exchange information with external organizations and individuals, as well as to discuss problems of the optical industry and of the individual SMEs.
- A dynamic web data base can be used to present the different organizations in the field, maintained by individual members, and to provide greater visibility of SMEs which are a dominating part of the industry.

While initially the main focus is on facilitating communication, collaboration and sharing of knowledge and information, on a second stage could be considered how to extend the KMS with e-learning functionalities in order to better support trainings organized for the community, the dissemination of educational materials, and to provide opportunities for on-line consultation with other experts, e.g. researchers and teachers.

The programme realization of the platform was decided to be based on CodeIgniter, a fast evolving open source framework supporting web pages design with PHP. The availability of reach libraries facilitates project design in this framework. In addition, CodeIgniter is based on the MVC (Model-View-Controller) model, described below. For fast deployment of the CodeIgniter framework will be used FTP client with open code – FileZilla, version 3.7.3.

The whole prototype structure will be based on PHP, HTML and JavaScript, and for the administration of the MySQL data base will be used phpMyAdmin 4.0.5.

IV. WEB PLATFORM DESIGN

The platform is implemented based on the three-tier Model-View-Controller (Fig. 2), separating the business logic of the graphical interface and using the data base of the product in three separate modules. This ensures easy readability, maintenance, extensibility and reusability of the code. In addition to all these advantages of a modular design, this architectural template allows a change of technology and the regeneration of each of the three components without affecting the remaining. The only prerequisite is to comply with the approved interfaces between each of the modules [5].

According to the requirements and needs of the opticians and optometrists from the virtual community in Bulgaria, the platform prototype provides two types of users registration: non-professional users (subscribers); and professionals (authors).

The pilot implementation of the KMS has taken into account the expected users roles and has incorporated special rules for the levels of access to different functionalities. In order to ensure the system security and to protect the content from unauthorized access and malicious acts, different access rules are implemented and different users' groups defined (Table I). All users should be registered on the platform, however, some filling only a short registration form with minimum data. A long registration form is foreseen for professionals (Fig. 3), who should prove their status, and after their accounts were approved by the moderator or administrator of the system they obtain rights to write, and in certain cases – to edit the content (Authors). The moderator is supported by a group of 'Editors' who have almost all administrative rights on the platform. The only difference with the administrator is that the editors can not promote other registered professionals to become editors – this is done only by the administrator.

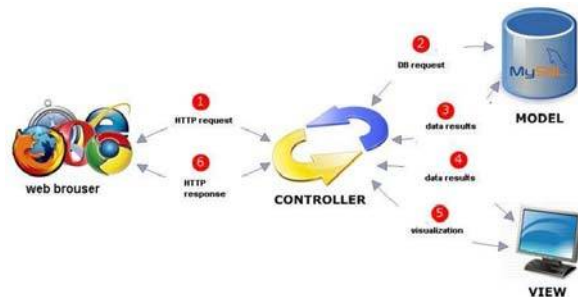


Figure 2. Model-View-Controller [5]

TABLE I. USERS ACCESS TO SERVICES ON THE PLATFORM /ABBREVIATIONS USED: R - READ; C - COMMENT; W - WRITE; W * (PUBLICATION AND ACCESS TO HIDDEN FORUM); E – EDIT, E * - EDIT * (CHANGE ONLY OWN PUBLICATIONS); D - DELETE/

	Non-professional	Professional	Moderator	Administrator
News	R	R/W	R/W/E/D	R/W/E/D
Articles	R/C	R/C/W/E*	R/C/W/E/D	R/C/W/E/D
Wiki	R	R/W	R/W/E/D	R/W/E/D
Library	-	R	R/W/E	R/W/E
Yellow pages	R/	R/W/E*	R/W/E/D	R/W/E/D
Forum	R/W	R/W*	R/W*/E/D	R/W*/E/D

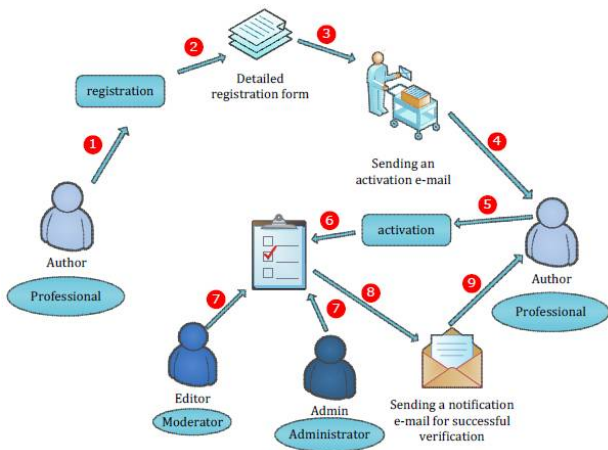


Figure 3. Registration of professionals [5]

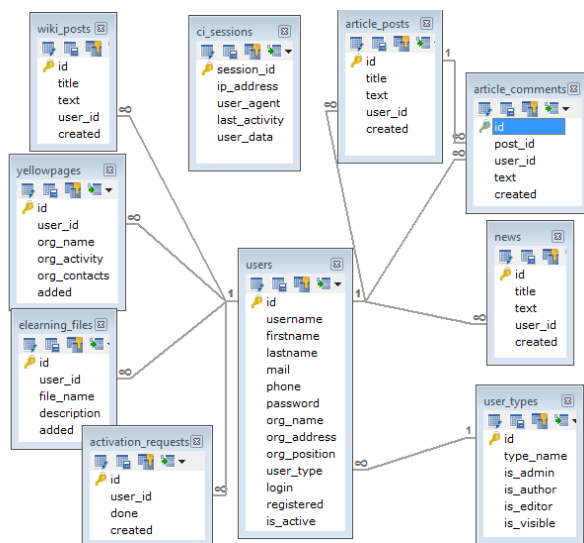


Figure 4. Model of the relational data base [5]

The concept of the data base design is linked to the opportunity for serving present and future needs of the community, maintaining fast changing structured and non structured data, as well as easily integrating them into new modules to be added to the KMS according to the needs. The present view of the data base is depicted in Fig. 4.

The collection of various unstructured data on the platform faces its developers with the challenge to collect, categorize and organize them in order to facilitate users to easy find and retrieve the information and knowledge they are looking for. Thus, metadata will be added (e.g. name of authors, type of publication, date, key words, etc.). A controlled vocabulary will help for data classification and better organization. It will be specially developed for the aims of the community providing a common terminology and a single taxonomy. Subsequently, the vocabulary will provide all area specific key words necessary for describing knowledge resources by the authors or for searching in the data base. A search engine will be integrated on the platform with opportunities for multi criteria search.

The present functionalities of the platform include:

- Homepage / News – Aimed at providing users with opportunities to get up-to-date information on upcoming events, meetings, changes in legislation,

technology developments, etc. RSS feeds will be integrated in later stage.

- Articles – The objective is to create a web blog where users could publish own articles and interesting information, search, comment and discuss them. This functionality is available to all registered professionals, as well as those having Facebook profiles. It is considered at a later stage to integrate also LinkedIn and Twitter users, as well as to ensure indexing, categorization and labeling of the articles.

- Wiki – It is integrated in the platform with the aim of creating a common space for easy creation, organisation and search of information and knowledge. The difference from articles is that no comments could be made, and the quality of information is ensured by the Editors. The objective is the Wiki to become an online encyclopedia for the professionals in the field of Optometry and Eye Optics in Bulgaria.

- Library – In comparison with Articles and Wiki, in the Library only moderators will be able to store files adding to them meta-data for search facilitation.

- Yellow pages – Presently, only organisations could be added in the yellow pages, alphabetically indexed. All Authors could add content. It is considered to add also individuals by integrating initially their SNS profiles. In order to facilitate finding expertise in the community, some search options will be integrated as well.

- Forum – Its objective is to serve as a platform for discussions on different topics of interest to all users, as well as obtaining feedback from end-users. A hidden forum will facilitate professionals collaboration, exchange of ideas and discussions on joint statements and the collective decision taking.

- Entry / Exit, Registration;
- Verification of users;
- Contacts.

Presently, the platform passed initial tests by the designer for the software realization, and by two professionals for the available functionalities. It was considered that the prototype meets the initial requirements. It is foreseen to widely discuss the concept and the prototype within the professional community for Optometry and Eye Optics in Bulgaria before finalising it.

V. CONCLUSION

The presented collaborative platform concept could perfectly serve the SMEs in the Optometry and Eye Optics in Bulgaria as it ensures sufficient functionalities to meet their present needs. However, as the literature on knowledge management suggests [1], the introduction of new products and services is not easily accepted by end-users. On the one side, there is a need for awareness raising and ensuring the necessary users' skills. On the other, knowledge sharing and collaboration require trust among users, which would be difficult in a community of competitors. The key here would be that every single user finds added-value in the new tools offered. Therefore, the concept envisages various functionalities in order to serve different interests: either for new knowledge and information, or for higher visibility. It is considered that the professionals from the community will benefit from

the opportunities for higher visibility (of them or their organization), access to new knowledge, exchange of ideas, collaborative problem solving, as well as obtaining end-users feedback. At the same time, as by every new project, some champions should be identified who could actively promote and support the development of content and the wide usage of the virtual collaboration platform. In addition, various media channels will be used for widely disseminating information about the platform.

In order to diminish the entry barriers, it is envisaged to organize a seminar for presentation of the platform and for training of its potential users among NABOO members. A survey among professionals will gather information on their satisfaction and the new features which they would like to be added in order to better meet their needs.

A more ambitious future goal is the platform to facilitate industry-academia collaborations, and especially debates on new research topics, innovation and joint future opportunities. The already established collaboration with some stakeholders for professionals' education and training could serve as a sound base for deepening collaboration for mutual benefits.

Another possible feature would be to add a jobs searching facility, which could provide information on employment opportunities (vacancies published by organizations) and the available expertise (CV published by job seekers). This would essentially support SMEs in finding the skills and knowledge they are looking for.

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