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MORMED: Towards a multilingual social networking platform facilitating Medicine 2.0

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Abstract— **The broad adoption of Web 2.0 tools has signalled a new era of "Medicine 2.0" in the field of medical informatics. The support for collaboration within online communities and the sharing of information in social networks offers the opportunity for new communication channels among patients, medical experts, and researchers. This paper introduces MORMED, a novel multilingual social networking and content management platform that exemplifies the Medicine 2.0 paradigm, and aims to achieve knowledge commonality by promoting sociality, while also transcending language barriers through automated translation. The MORMED platform will be piloted in a community interested in the treatment of rare diseases (Lupus or Antiphospholipid Syndrome).**

Keywords— **Medicine 2.0, Social Networking, Multilingual Web, Information Management, Rare Diseases.**

I. INTRODUCTION

In the early 2000s, eHealth was seen as "an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies" [1]. According to Eysenbach, eHealth, as a term, encompasses "not only a technical development, but also a state-of-mind, a way of thinking, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology" [1].

By the end of the decade, the broad adoption of Web 2.0 technologies [2,3] led to the emergence of a new term for relevant applications, services and tools: "*Medicine 2.0*". Central to Medicine 2.0, is the trend of sharing health-related experiences and data with a "crowd" of patients and professionals, with the aim of harnessing the collective wisdom at the benefit of reaching knowledge.

Medicine 2.0 is defined as comprising "web-based services for health care consumers, caregivers, patients, health professionals, and biomedical researchers that use Web 2.0 technologies as well as semantic web and virtual reality tools, to enable and facilitate specifically social networking, participation, apomediation, collaboration, and openness within and between these user groups" [4]. Web 2.0 applications seem to have contributed towards bringing geographically dispersed groups of people with common interests together. Even in such circumstances the requisite for expressing in a common language seems to be restricting: people not conversant in that common language could find themselves excluded. This issue may become a burden to the effective dissemination of valuable knowledge among dispersed medical communities interested in topics where information is scarce, such as rare diseases. MORMED attempts to address this problem by developing a multilingual social networking and content management platform.

MORMED (Multilingual Organic Information Management in the Medical Domain) is a research project which aspires to address all the above mentioned dimensions of Medicine 2.0. The developing platform is aimed at promoting online collaboration and diffusion of knowledge within online communities, while transcending geographical and language barriers. This is achieved by combining a semantically-enhanced social networking and content management platform [5,6] with technologies enabling machine translation and post-editing by human experts to make content available in multiple languages. MORMED will be piloted in a community interested in Lupus or Antiphospholipid Syndrome (Hughes Syndrome), involving researchers, medical doctors, general practitioners, patients and patient support groups.

The rest of the paper is organised as follows. Section II briefly discusses how MORMED is positioned with respect to other Web 2.0 applications in the health domain. Section III presents an overview of the envisaged MORMED platform, starting with the motivation behind MORMED, its key features, the targeted user groups, and the proposed architecture. Finally, conclusions and directions for future research during the project are presented in Section IV.

II. WEB 2.0 IN HEALTH

Numerous applications offering health-related services are available nowadays. The nature of these applications varies; from informative websites to elaborate web applications employing sophisticated tools and algorithms, each seeking to offer valuable medical information. [7, 8] are examples of informative websites providing timely and credible content. There also exist discovery engines for support groups [9] and medical professionals [10,11]. Professional medical blogs, wikis [12,13] and social bookmarking [14] sites are excellent cases of services aggregating valuable information resources for professionals and laymen. Finally Personal Health Application Platforms, such as [15,16], have emerged that store detailed medical records and share them with professionals and other patients.

Moreover, the potential of Web 2.0 tools in medicine is an active research area of medical informatics. Social networking [17], online collaboration [18] and semantic technologies [19] have been employed to facilitate the challenges of medical education and medical content sharing.

MORMED approaches the domain from a different perspective and shifts the focus towards sharing experiences, building upon sociality and leveraging Web 2.0 semantically enhanced tools that support multilingualism. Thus MORMED aims to achieve “just-in-time” diffusion of the collective knowledge and act as an apomediary for patients, professionals and researchers of a specific area, while overcoming the language barrier.

III. THE MORMED SOLUTION

A. Motivation

Even though information on topics of general interest is offered online in abundance, information for restricted and highly focused communities, such as communities interested in the treatment of rare diseases, is not widely available and easy to find. An example such a community is people interested in the treatment of Lupus, or Antiphospholipid Syndrome. Diseases like Lupus appear all over the world, but are very rare, making relevant information resources highly dispersed and difficult to locate. Stakeholders that suffer from this lack of information are not only the patients, but also general practitioners and experts who could benefit from information about clinical trials, research theories or results, patients’ experiences, etc.

The scarcity of information due to the rareness of the particular disease is aggravated by the fact that stakeholders come from different parts of the world, and typically communicate in no language other than their native tongue. A certain educational level is required in order to not only communicate in a foreign language, but also to understand information making use of scientific terminology. Communication between the various stakeholders, e.g. between researchers and general practitioners (GPs), or between GPs and patients, is currently cumbersome, or even non-existent, due to the two-dimensional language barrier of national languages and specialised terminology.

Rare diseases such as Lupus could be treated more effectively if experiences and relevant information could be shared rapidly across borders and stakeholder communities. Scientific research could be promoted if experiences and information were accessible in a way that nurtured collaboration and knowledge commonality. All of those requirements give rise to the need for a novel means to support contribution, effective dissemination and retrieval of content, as well as to promote informal social networks which exchange ideas and experiences, overcoming the language barriers.

B. The Proposed Solution

Contemporary Web 2.0 tools allow for the production, instant sharing, and consumption of content, in an intuitive way which lowers the barrier of technological complexity and facilitates the rapid creation of informal communities centred on common themes. People concerned about, suffering from, or working on rare diseases, can benefit from these technological developments in order to access valuable information, publish their experiences, and socialise.

The intuitiveness and usability of Web 2.0 applications, further enhanced with semantic technologies for “intelligent” information processing, and combined with automated translation services, can open participation to individuals regardless of educational, professional or language background. The use of recommendation techniques can further promote effective discovery of information, since relevant content is recommended to people according to their profiles. Information resources and documents from parallel multilingual web sites are bookmarked and thus reused and complement the published content. Within this context, people will be motivated to publish their experiences and comment on the experiences of others, knowing that the language barrier is transcended, and that information is made available to the widest audience possible.

MORMED will work towards this direction by developing a platform that is tuned for supporting communities interested in the treatment of rare diseases. The platform will support efficient online collaboration for content publishing and social networking in a multilingual environment. Semantically enriched Web 2.0 tools are combined with comprehensive automated translation and text summarisation tools to form the MORMED platform.

a) Key features:

The MORMED platform aims to promote *the creation of online communities and groups with similar interests*, where people can contribute any information in an informal way. These groups can be administered and moderated by one or more individuals. The group participants will have permissions and rights assigned by administrators. Visibility of content and data privacy issues can also be managed in a group- or individual-based manner, reassuring that no information is exposed to unauthorized access.

The users of MORMED will be able to post their experiences, concerns, research results or news items in a straightforward way, thus triggering discussions and comments, and promoting sociality. User friendly tools will support the *collaborative authoring* of texts. All content published will be possible to *annotate with descriptive tags*. Suitable tags will be suggested by analysing the content in a semantically-enhanced way. These tags will contribute to building a *community-enriched taxonomy of terms* descriptive of the specific domain. Thus, users will benefit from targeted search results, grouped views of the published content and many more features.

The MORMED platform will employ mechanisms that will not only allow users to retrieve the desired information, but also have information relevant to their interests “pushed” automatically (notification, RSS feeds). Moreover, user profiles will be analysed (favourite content, tags used, etc) and conclusions will be drawn in order to enhance the quality of recommendations.

To *overcome the language barrier*, MORMED will offer content in multiple languages. Efficient translation tools offering pro-active or on-demand translation of the content will be integrated to the platform. In cases where high quality of translation is demanded, a human expert will be engaged in the translation process. Platform users will be able to rate the quality of translations and thus trigger post-editing of content items with low ratings.

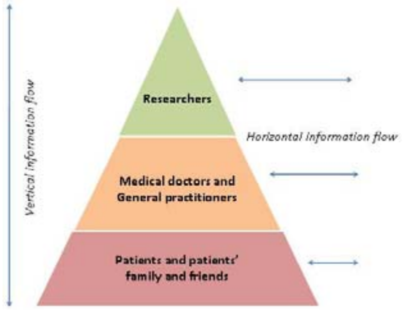

Fig. 1: Information flow between various users

b) Use:

MORMED will serve as a platform for dissemination and exchange of multilingual information between both experts and laypeople. Their primary goals will be to share their own experiences, to seek people with similar interests and to discover relevant content in an intuitive way. The users of MORMED are expected to be:

1. Researchers collaborating in research projects. They could reach and communicate with GPs and patients; post recruitment information for clinical trials and make it available to GPs dealing with patients.
2. Medical doctors and GPs requiring information on rare diseases and accessing international information resources.
3. Patients, also represented by patient support groups, like family and friends, requiring and exchanging information on international level. Patients contribute their experiences are used as case studies to further fuel research activities and improve common practices.

As shown in the Fig. 1 the MORMED platform will facilitate the communication and information flow in intra-user type (horizontal) and inter- user type (vertical) manner, as far as researchers, medical doctors, GPs, patients and other interested parties are concerned.

b) Architecture:

Technically, the project combines a semantic Web 2.0 knowledge management platform, result of the OrganiK project [4] with advanced automatic translation tools [20], provided by the Language Technology Centre, in order to support information exchange and bridge the language gap. The system architecture approach aims at providing an open platform, based on open standards, which is extensible and scalable, and applicable to different domains.

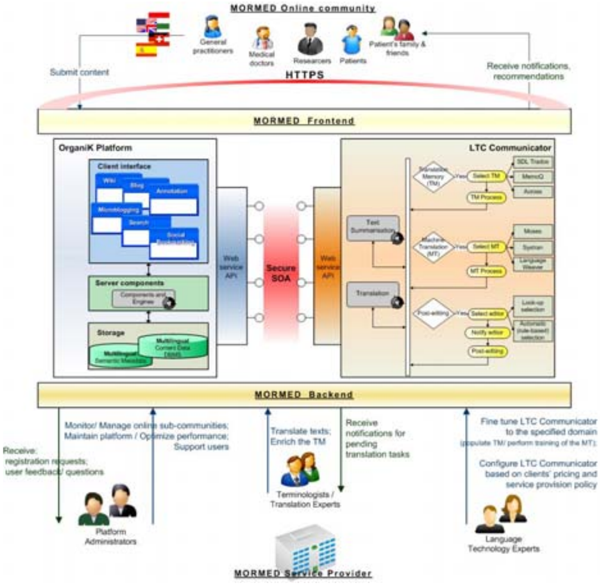

Fig. 2: MORMED envisaged Architecture

The envisaged architecture of the MORMED platform is illustrated in Fig. 2. The system to be developed will consist of two main components: The OrganiK platform and LTC Communicator. The OrganiK platform is a next generation knowledge management system that manages and promotes social structures. OrganiK combines social software applications and semantic technology. This includes social software applications (wiki, blog and microblogging work spaces, collaborative bookmarking, search engine), enhanced with semantic information processing tools (semantic search, recommender system, content and user behaviour analyser, collaborative filtering engine, etc). LTC Communicator will be the multilingual production system that will be operating in the background. It is a workflow system incorporating translation tools and machine translation, further enhanced by open source text summarization tools.

IV. CONCLUSIONS

In this paper we have introduced MORMED as a platform that addresses the need for social networking, participation, apomediation, collaboration and openness in the spirit of Medicine 2.0. MORMED aims to provide a social platform and content management system that will promote the creation of informal social networks and will allow the effortless contribution of content, as well as its effective dissemination and retrieval. Through MORMED’s support for multilingualism, it is expected that dispersed user groups with similar interests will be brought closer, thus transcending geographical, educational and language barriers.

The platform will be developed as a combination of a semantically-enhanced Web 2.0 knowledge management platform, developed within the OrganiK research project, and language technology enabling machine translation and human post-editing, developed by the Language Technology Centre. It will be customised to address the requirements of a community interested in Lupus or Antiphospholipid Syndrome, which will provide the basis for evaluation.

The research challenges in MORMED lie in employing efficient techniques for semi-automated translation of the content and the community-enriched taxonomy, as well as exploring options for effective information retrieval of multilingual content and targeted information push methods. Moreover, various recommendation algorithms and personalisation techniques will also be evaluated. Finally, the way the users of the platform will choose to organise themselves, collaborate and exchange information will be an interesting aspect of the project from a social point of view.

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