

Editorial

Allan Hanbury,
Vienna University of Technology, Austria
Hanbury@ifs.tuwien.ac.at

One of the defining aspects of the Khresmoi project is its user-centred design approach. During the first part of the project, user requirements were gathered through questionnaires and interviews with future users of the Khresmoi search engine. This has resulted in a solid basis on which to build the Khresmoi search engine. This newsletter presents some highlights of the results of the questionnaire aimed at physicians. At the same time, the components that will make up the Khresmoi system have been further developed and, in the first of a series, a short overview of the Mimir software is given. At present, the project emphasis is on integrating the constituent components to create a robust first version of the Khresmoi search engine. This will be extensively evaluated in user tests beginning in September, the results of which will be used to further guide the development of Khresmoi.

TOPICS

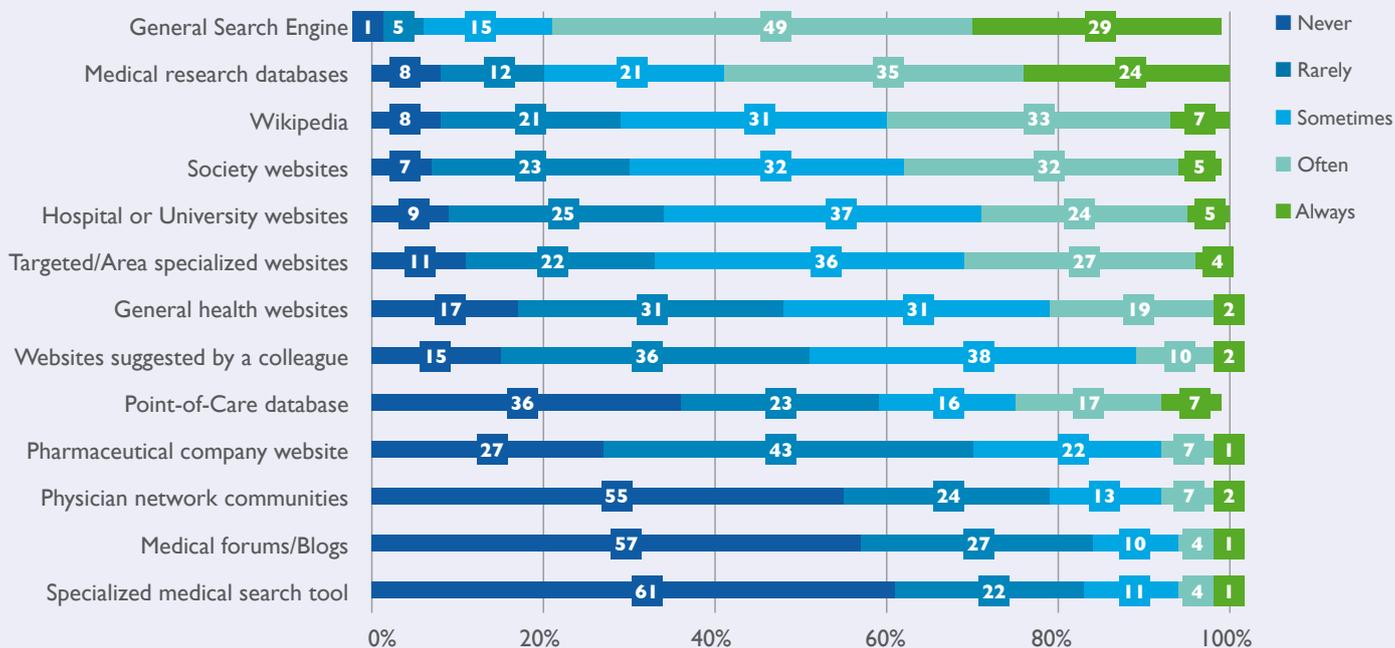
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Highlights from the physician study

Manfred Gschwandtner & Marlene Kritz
Society of Physicians in Vienna, Austria
info@billrothhaus.at

Frequency of use of online resources amongst physicians



Between June 2011 and July 2011, a multilingual web-based study on the information needs and online search preferences of medical professionals was conducted by the Society of Physicians in Vienna, in collaboration with the Health on the Net Foundation and the Vienna University of Technology. An online questionnaire including

questions on the information needs, use of online resources, barriers to search and online search preferences was disseminated to 15,000 physicians across Europe. A total of 556 physicians and 4 final-year medical students took part in the survey. Most respondents were internet savvy, self-employed or employed in public health settings,

had high levels of medical work experience, regular patient contact and were above 50 years old. The majority of participants reported working as specialists, general practitioners or physicians in training.

Information need and use of resources

It was found that both the need to obtain immediate information (“immediate need”) at the point-of-care, as well as the requirement to pursue medical updating (“educational need”) were of main importance. Overall, physicians reported most often looking for information on drugs, treatment and medical education and predominantly using generic search engines such as Google, medical research databases (e.g. Pubmed) and Wikipedia.

Search behavior

The majority of participants reported pursuing a search by typing in keywords, in most cases representing the condition (as opposed to the symptom), then clicked on the link that appeared most relevant whilst frequently skimming through second and third result pages. With regard to advanced search options, most importance was placed on date range and language. Popular restriction criteria were to journals and books. Quality was primarily rated on the basis of information source (author, publisher) and the time of last update. Dominant barriers to retrieving online information were an overload of irrelevant search results, lack of time and a search output that was too general or of questionable trustworthiness.

Expectations of an ideal medical search engine

When asked to think about “the ideal medical search engine” most importance was placed on the high accessibility of relevant and trustworthy results. Preferred was a display of 5-10 links/page and a categorization based on type of content, author and publisher, presumably to speed up the quality evaluation. Despite high levels of self-reported competence of English, most found it important to have the option to being able to filter information by language. A number of tools were identified as important and are expected to improve search efficiency, including a novel but very popular idea for a tool comprised of a “quality rating system among physicians”.

Highlights and differences between groups of physicians

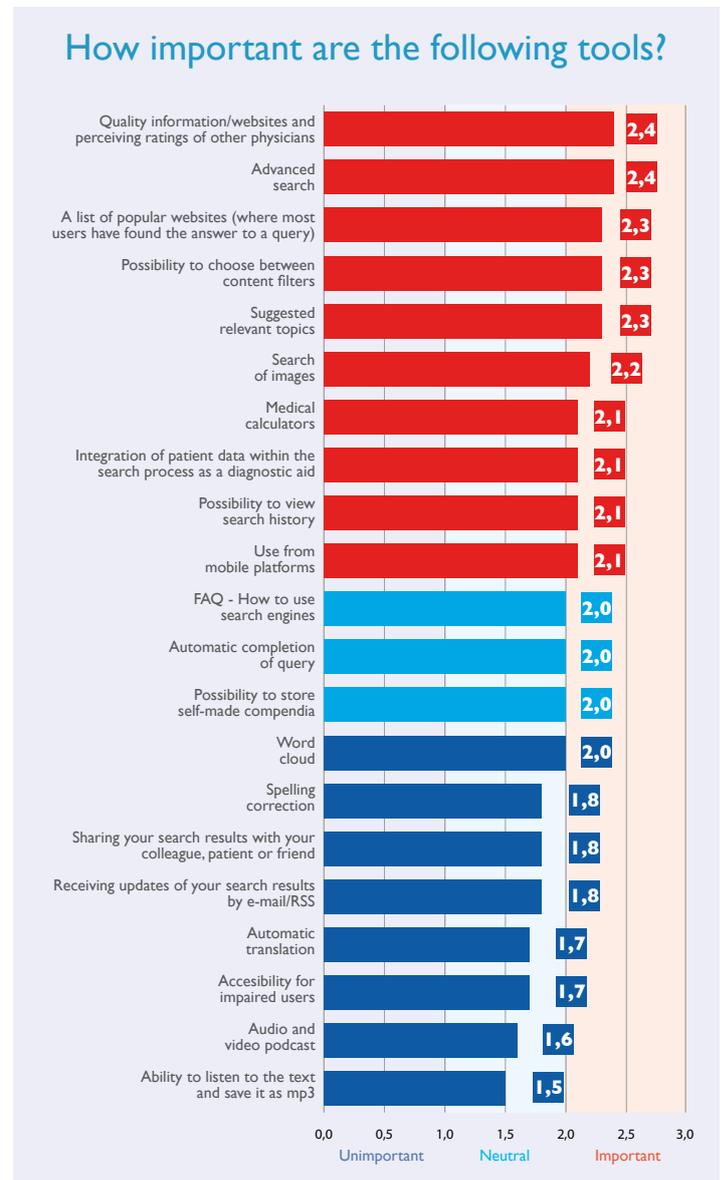
Age, level of specialism and place of work appeared to have some impact on the search requirements of physicians. For example, younger physicians were more likely to access medical information via mobile devices, general practitioners presented themselves as the most time constrained group while self-employed physicians appeared to be most responsive to collaborative tools. Specialists and physicians employed in an academic setting were most likely to look for clinical trial information and expressed some preference for medical research databases, area-specialized websites and society websites. On the other hand, general practitioners were more likely than other groups to report looking for disease descriptions and

primarily sought secondary/ tertiary resources such as Wikipedia and general health websites.

Summary

Overall, the results of the survey emphasize the need for a multilingual medical search engine providing relevant, accessible and organized physician content. The findings provide good indication on the filter, categorization, tools, resources and content requirement of physicians. To our knowledge, it is the first large-scale, qualitative and multilingual study to directly address search preferences of physicians. The results are expected to provide an essential contribution towards algorithms, interface design and the data selection within the Khresmoi project.

More detailed information on the survey results can be found at: <http://www.khresmoi.eu/assets/Deliverables/MP8/KhresmoiD812.pdf>



Mimir: enabling multi-paradigm indexing and retrieval

Angus Roberts,
University of Sheffield, United Kingdom
a.roberts@dcs.shef.ac.uk

Mimir (from Norse mythology, "The Rememberer"), is a multi-paradigm information management index and repository which can be used to index and search over text, annotations, semantic schemas (ontologies), and semantic meta-data (instance data). Khresmoi is creating indexes to medical texts that can take search beyond retrieving those documents that match the words of a user's query. Khresmoi uses semantic annotation to find and mark those words and phrases in texts that match complex concepts in the myriad of databases, vocabularies, and ontologies that describe biomedical knowledge. Queries can then be written across both the texts and these knowledge bases. We could, for example, ask to pull back all texts that talk about drugs used in the treatment of malaria. The facts of which drugs treat malaria are retrieved from the knowledge bases, and then the mentions of the individual drugs are retrieved from the text of documents. Mimir allows queries that

arbitrarily mix full-text, structural, linguistic and semantic queries and that can scale to gigabytes of text.

Mimir Version 4.0 has recently been released by Khresmoi project partner and Mimir developer University of Sheffield. Before Version 4.0, Mimir would return one result for every part of a document that was an exact match to a query. As each result was an exact match, it did not make sense to rank them according to which best matched the query. Mimir Version 4.0 changes this, and provides a document-centric view of results by default. Result sets can now be ranked with a choice of popular ranking algorithms. For example, documents could be ranked according to how many times a query matches the document. A programming interface is also provided, enabling third parties to add arbitrary ranking algorithms.

More Information is available here: <https://gate.ac.uk/mimir/>

Project News

Hélène Mazo,
ELDA, France
helene.mazo@elda.org

Georg Langs,
Medical University of Vienna, Austria
georg.langs@meduniwien.ac.at

Henning Müller, University of Applied Sciences
Western Switzerland, Switzerland
henning.mueller@hevs.ch

KHRESMOI present at ECR 2012 IMAGINE

In March 2012, KHRESMOI was invited to present recent results at a booth at the IMAGINE exhibit of the ECR (European Congress of Radiology), the largest radiology congress in Europe that gathered over 20,000 participants from 102 countries. This exhibit was organized by the European Institute of Biomedical Imaging Research (EIBIR), a central hub to exchange latest research on computational approaches in medical imaging. Georg Langs and René Donner from Khresmoi project partner Medical University of Vienna presented the current state of the project work, focusing on the image analysis approaches relevant in clinical radiology. The demonstrations of fully automatic anatomy identification and pathology retrieval – the building blocks of the search engine – spurred lively discussions about the performance and impact on the clinical radiology workflow.

We showed how the search engine could identify the location of arbitrary query cases (e.g., head MRI, abdominal CTs) while showing

comparable image data of other patients within less than a second, and without any keyword entered by the user. Pathology retrieval was able to identify similar tissue anomalies in CT data of other individuals. The demonstrations illustrated the relevance of the technology in a clinical setting, and highlighted potential directions even beyond the project plan.

As a conclusion, we felt that the radiology community is well-aware of the place such a system could have in radiology practice. While everybody agreed that the accurate retrieval of diagnostically relevant cases is very difficult, there was consensus on the high value brought by this information during radiological work.

A video of the demo can be viewed here:

<http://khresmoi.eu/news/anatomy-search-prototype-video/>

MCBR-CDS 2011

The second workshop on Medical content-based retrieval for clinical decision support (MCBR-CDS, <http://www.mcbr-cds.org>) was held at MICCAI 2011 (Medical Image Computation for Computer Assisted Intervention) in Toronto, Canada in September 2011. Khresmoi organized the workshop in collaboration with the IBM

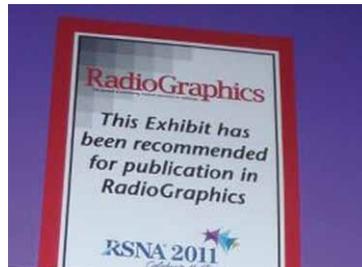
T.J. Watson Research Center, USA and Tel Aviv University, Israel. Over 40 participants attended the workshop featuring two high level speeches given by invited speakers and 12 oral presentations. The proceedings are published as volume 7075 of Springer Lecture Notes in Computer Science.

At a glance

RSNA 2011

Khresmoi participated in the Radiological Society of North America conference (RSNA 2011, <http://www.rsna.org>) in Chicago, USA in November 2011. The conference was attended by over 60,000 participants. Khresmoi presented the study of image search behavior of radiologists using eye-tracking as an oral presentation and the first year prototype demos for the radiology use case as a booth. The presentations attracted a significant amount of interest and the Khresmoi booth was visited by a large number of radiologists. The demos presenting the prototypes received useful feedback and initiated interesting discussions. The exhibit was awarded an invitation for scientific paper submission to the Radiographics journal by the Scientific Committee of the congress.

Prize won at RSNA 2011



Project Coordinator
Henning Müller
University of Applied Sciences
Western Switzerland
Tel: +41 27 606 90 36
Fax: +41 27 606 90 00
henning.mueller[at]hevs.ch

Scientific Coordinator
Allan Hanbury
Vienna University of Technology
Tel: +43 1 58801 1883 10
allan.hanbury[at]tuwien.ac.at

Partners

University of Applied Sciences
Western Switzerland (CH),
Vienna University of Technology (AT),
Atos Origin (ES),
ELDA (FR),
Ontotext (BG),
Dublin City University (IE),
University of Duisburg-Essen (DE),
Charles University in Prague (CZ),
The University of Sheffield (UK),
Health on the Net (CH),
Medical University of Vienna (AT),
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€ 10.534 m

EC Contribution:
€ 8.036 m

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PROMISE Winter School 2012



Khresmoi was one of the co-organizers of the PROMISE Winter School 2012 held in Zinal, Switzerland in January 2012. 80 participants from 25 countries attended the school with the topic "Information retrieval meets information

visualization". The school lasted 5 days and included 20 high level talks of 90 minutes. The participants had the opportunity to exchange with internationally renowned university professors but also with research executives from companies such as Yahoo and Microsoft. Zinal, situated in the Swiss Alps also offered activities such as skiing, trekking and tasting the local delicacies, contributing to the success of the event and many lively discussions.

Upcoming events

- Khresmoi will be participating in LREC 2012, held in Istanbul from May 21-27, 2012, both as an exhibitor in the EU Village and as a participant in the LREC EU Session on May 24.
- Henning Müller, coordinator of Khresmoi, will be present as panel presenter at CBMI 2012 in Anney France, discussing on content-based multimedia retrieval in June 2012.
- Allan Hanbury and Henning Müller will give a tutorial on Searching Text and Images in the Medical Domain at the Medical Informatics Europe (MIE) Conference in Pisa, Italy in August 2012.
- Khresmoi will organize ImageCLEF 2012, a benchmark for medical image retrieval located as a CLEF 2012 lab in Rome, Italy, September 2012.
- Khresmoi is a co-organizer of the workshop on search computing organized in Brussels in September 2012.
- Khresmoi will organize the 3rd workshop on content-based medical retrieval for clinical decision support at MICCAI 2012, Nice, France, October 2012.
- Khresmoi partners are currently finalizing a special section in the journal Methods of Information in Medicine on medical information retrieval, to be published in 2012.

To order the newsletter and receive regular updates:
<http://www.khresmoi.eu/contact-us/keep-me-updated/>

