

A Collaborative Webbased Framework with Optimized Mobile Synchronisation: Upgrading to Medicine 2.0

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Abstract—Magazines like BusinessWeek and Time have confirmed “The Power of Us” as we collaborate in the Web 2.0. However, current medical practice still relies on Medicine 1.0. The use of webbased collaborative frameworks (“wiki’s”) combined with optimized output and synchronisation for mobile devices can help us upgrading to Medicine 2.0. This serves as an aid for community-driven clinical decision support systems increasing medical safety. NeuroWiki.com will be demonstrated as a useful concept in this philosophy, and its technical background will be described.

Index Terms—mobile, pda, handheld, wiki, Medicine 2.0

I. INTRODUCTION

The number of peer reviewed journals almost doubled over forty years, and the number of citations yearly added to MEDLINE increased four fold (table 1) [1]. Although reviews and meta-analysis resources may serve as floating aids in a sea of knowledge, it remains doubtful whether they let us reach the shore. Accurate numbers on the amount of articles having clinical impact, are lacking. Citation indices are neither capable of measuring the quality of publications, nor the clinical impact [2]. For all kinds of meta-analysis resources and databases little evidence exists supporting its effectiveness in enhancing their uptake or changing clinician behaviour [3]. As evidence does not speak for itself, it seems worthwhile to expand the horizon.

TABLE I.
MEDLINE / PUBMED SUMMARY INDEXING STATISTICS

	1965	2005
Number of journals indexed in Index Medicus	2,241	4,279
Number of citations added to MEDLINE	151,635	606,000

II. MEDICINE 2.0

A. Lessons learned from the web

In 2004 the term Web 2.0 was defined [4], thereby promoting the Internet as a platform of services in which the user controls and possibly shares his own data to harness collective intelligence. This philosophy has lead to cover articles in magazines like BusinessWeek (figure 1)



Figure 1. BusinessWeek cover of June 20, 2005

[5] and Time [6] emphasizing the importance of collaborative online communities. The same principles can be applied by clinicians to install “Medicine 2.0” [7]. A collaborative webbased framework (“wiki”) has proven to be accurate [8] and may overcome the problems mentioned in the first paragraph by stimulating active participation of the user group. Content experts can share and maintain knowledge, add new articles to the database, and discuss different opinions in an open, accessible form.

B. Considering success predictors

To be successful this system should meet three criteria. First, it should be comprehensible to use, not only for technologists, but mainly for content experts in all fields. Second, especially in a field where professionals do not have a fixed workplace, such a framework should allow access to this knowledge without a desktop computer available. As safety regulations in many hospitals prohibit the use of cell phones or wireless networks, the framework should also allow access to the data without continuous Internet access. Third, content quality control is mandatory. In a collaborative system, peer-review is a continuous and active process. Information that is generally accepted as valid could be shown as the “stable version” of the article, with a separate editable addition of new conclusions that are still under debate [8].

III. MOBILE COMPUTING

A. Current situation

Mobile computing has an important place in modern clinical practice where it supports medical students, physicians and patients [9-12]. Physicians frequently use decision support software (drug references, calculators,

textbooks) that may change management in up to 30% of cases [13]. Most patients realize that there is too much medical information to be remembered by the physician, and 50% reported an increased confidence in a physician using a personal digital assistant (PDA), whereas only 5% reported decreased confidence [13]. Besides commercially available software, physicians add their own medical notes to their PDA. However, not only is data sharing difficult this way, data loss due to hardware or software failures and slow manual data entry are main disadvantages of this technique [14].

B. Improving existing technology

The author developed a simplified webbased collaborative framework (NeuroWiki.com, figure 2) that allows content experts to create short notes, which can be shared and exported to mobile devices [15]. Information is automatically converted for optimal display on the small PDA screen (figure 3), and hyperlinks between articles are reconstructed to work even without continuous web access. The next section will provide some technical background information.

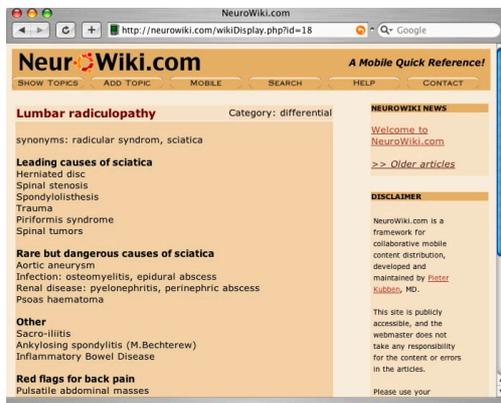


Figure 2: NeuroWiki.com on desktop computer running Mac OS X

IV. TECHNICAL ASPECTS OF NEUROWIKI.COM

The website is running on a Linux Apache server, and has been programmed using open source software (PHP scripting with MySQL database). Cascading Style Sheets (CSS) provide a universal interface throughout the website. Additional markup has been applied with XHTML and HTML. All techniques are approved by the World Wide Web Consortium (W3C) [16], thereby offering maximal cross-platform compatibility on all major desktop operating systems: Windows, Linux and Mac OS X. A separate script prepares all pages for optimal display on handheld computers. It does not only change the text markup, but also recreates hyperlinks between wiki articles: this provides access to other topics in the database without the necessity for an active Internet connection. Cross-platform synchronisation for handheld computers is performed using AvantGo [17], currently targeting the major mobile operating systems like Windows Mobile, Palm OS, Symbian Series 60 / UIQ, and Blackberry. This synchronisation can be performed manually, but also completely automatic while backing up the handheld's data to a desktop computer at any time. As the current small screens of PDAs makes data input a cumbersome task, the developed framework requests database maintenance currently on desktop operating systems only.

V. FUTURE DIRECTIONS

Besides improvement of the usability and technical options of the current system, future developments need to focus at interactivity. Mobile computers should not be degraded to electronic books. However, as the system is as weak as the weakest link, providing accurate and updated content is the primary concern. Wiki-based techniques have proven to be a useful approach to achieve this goal, and should also be considered in future developments.

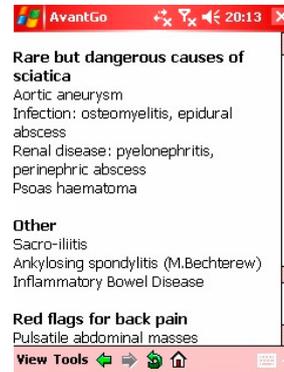


Figure 3: NeuroWiki.com on handheld computer running Windows Mobile

VI. CONCLUSION

Evidence does not speak for itself, emphasizing the need for clinical decision support systems. Webbased collaborative frameworks offer a method for active participation of content experts, and can contribute to a relevant and frequently updated source of information. This article demonstrates such a framework with an extension for optimal synchronisation on mobile devices, allowing access even without wireless Internet connection. The concept provides a basis for future directions where Medicine 2.0 is applied using interactive applications built on community-driven information resources.

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