Medical Informatics Europe 2002
G Surján et al. (eds)
IOS Press 2002

Webmastering in Academic Institutions: a New Job Opportunity

Benoit THIRION [a], Stéfan Jacques DARMONI [b, d],
Magaly DOUYERE [b], Jean-Philippe LEROY [c]

[a] *Medical Library,*
[b] *Computer and Networks Department,*
[c] *Intensive Care Department, Rouen University Hospital,*
1 rue Germont F76031 Rouen Cedex, France;
[d] *Perception and Information System Lab & Medical School, Rouen University, France;*
Email: Stefan.Darmoni@chu-rouen.fr

Abstract. In cyberspace, the health webmaster could be regarded as a virtual editor-in-chief, in charge of content and design. In this circumstance, he/she must follow quality criteria when building any resource. At the Rouen University Hospital (RUH), we have chosen "Net Scoring" as an effective tool to aid the design of a quality Web site. "Net Scoring" contains a list of 49 criteria which fall into eight categories: credibility, content, links, design, interactivity, quantitative aspects, ethics, and accessibility. The webmaster is the key element of the editorial board process. He/she must regularly monitor the Web site in order to retrieve information about whether the site is used and by whom: the method most commonly used is log analysis. At the RUH, an average of 9,000 unique machines visit our Web site each working day. Conclusion: webmaster is a new job opportunity in academic institutions, in particular for medical informaticians and medical librarians both whom are information science professionals.

1. Introduction

At the dawn of the third millenium, the Internet has become a major source of information for the health professional and the Netizen defined as "citizen on the Net". The resources (both sites and documents) available on the Internet about health in general and medicine in particular are growing exponentially. To date, CISMeF (Catalog and Index of French-speaking Health Resources on the Internet) published by the Rouen University Hospital (RUH) since February 1995 has indexed above 9,800 resources [1]. Its URL (Universal Resource Locator) is http://www.chu-rouen.fr/cismef. Extrapolating from the number of HTML pages written in French in 1998 [2], we estimate that French-speaking health resources represent only 2% of world resources. Therefore, the number of world health resources could be around 500,000.

All of these sites must be managed by a webmaster and an editorial board [3]. The existence of a webmaster is a key quality criterion for a health site [4-5]. By analogy with a paper journal, a webmaster could be considered to be the editor-in-chief. He/she is in charge of the content and the design of the site. We will explain in detail in the paper all the missions of a health webmaster, which are quite heterogeneous. These views are specific to academic institutions and have been extrapolated from a French university hospital.

2. Main Criteria to Assess the Quality of a Web Site

In order to help French-speaking webmasters to create a Web site of high quality, we have developed «Net Scoring» under the "Centrale Santé" umbrella [4]. "Centrale Santé" is a non-profit organization consisting of engineers (from the Ecole Centrale de Paris), physicians, librarians and lawyers. The multidisciplinary character of this group should ensure maximum objectivity. The "Net Scoring" is a French quality benchmarking system with a list of 49 criteria used to assess the quality of health information available on the Internet. The first version was finished in August 1997 (URL http://www.apuis.com/sante/fqualic0.htm). The idea was largely inspired by a US study [5]. The updated version (version 4.0) is available at the following URL: http://www.chu-rouen.fr/netscoring/. «Net Scoring» is in use by many prominent French institutions [6].

These 49 criteria fall into eight categories: credibility, content, hyperlinks, design, interactivity, quantitative aspects, ethics and accessibility. Every criterion is rated 0 if it is very bad, 1 if it is bad, 2 if it is good and 3 if it is very good. Every criterion has a weight: 3 if it js essential, 2 if it is important and 1 if it is minor. The total of these weighted criteria produces the overall score of a site (maximum = 312). All the criteria were chosen by expert consensus.

The webmaster needs to precisely analyze his/her Web site logs to determine the statistics of usage. The RUH Web site is currently using an Apache server on a Linux machine. The webtrends log analyzer version 5 is used to produce statistics from the log analyze after excluding requests performed by the RUH's 2,500 computers.

The webmaster should consider several quality criteria when considering and creating content of his/her Web site. At the RUH, there are two webmasters one medical informatician and one medical librarian.

In order for a Web site to be of a high quality, it is essential that at least some of the «Net Scoring» criteria are fulfilled: (a) Deontological rules and ethics code of conduct must be respected, i.e. excluding in the Web site any personnel data from the Netizen if unnecessary and ensuring the maximum security of this data (encryption, authentication) if necessary; (b) For each document on the site, the source must clearly be established giving the name and credentials of the authors, the name of the institution, including the date of creation, the date of last update and the date of last revision; (c) An editorial board process must be followed in which the webmaster must play a key role; to list name and credentials of the editorial board. At the RUH, in late 1996, an editorial board, including the two webmasters, was created to the control the quality and coherence of the Web site. This editorial board also contains the CIO (Chief Information Officer), one computer scientist, and two physicians; (d) The Web site navigability should be optimized in order to help the Netizen and/or the health professional to find the relevant information quickly and easily, using an internal search engine, what's new page, help page and map site; (e) Answer systematically to each Email received. At the RUH, we receive a dozen Emails daily, most of them from Netizens: i.e. we reply that our site does not perform teleconsultation; and (f) Promote the Web site, optimizing its accessibility among the main search engines and catalogues and the main academic and government Web sites.

The evaluation of the RUH Web site using the "Net Scoring" was conducted by its two webmasters. The global score is 246/312 (0.79). This quality control check is necessary to ensure the quality of the Web site. At the RUH, this quality control process using "Net Scoring" is performed every year.

In March 1998, CISMeF obtained the label "Experimentation of public interest" by a French inter-ministry committee (procedure "Information Highways"). This label will stay with the site. In October 2000, the two webmasters of the RUH Web site obtained the Prize

Albert Sezary from the French Academy of Medicine for the creation of CISMeF. This label and this prize are also indirect criteria of quality of the RUH Web site.

3. Use Patterns of a Web Site

One of the key roles of the webmaster is to monitor the Web site as precisely as possible to obtain information on when the site is used and by whom. The methods most commonly used are the log analysis and the questionnaire. At the RUH, for the period of two months (October and November 1999), a questionnaire concerning the quality of the Web site based on «Net Scoring» was proposed to each user on a voluntary basis. We will not detail its results because only 55 questionnaires were filled out (less than 0.05% of the users) generating a high number of biases.

The «Net Scoring» defined two reproducible criteria to quantitatively measure a Web site: (a) number of machines (IP addresses) visiting the site and (b) number of visualized documents or number of requests for a dynamic site. The number of machines is a criterion used to estimate the number of Netizens visiting the Web site. These statistics underestimate the real figures due to the practice of file caching.

At the RUH, the Web server software, which provides documents to users on request, does not know the identities of individual users, such as their E-mail address. We refuse to use cookies to obtain personal data from Netizens to avoid profiling ethical problems, such as who is sponsoring the site, the purpose of the site, whether the information will be retained and if so by whom, whether information regarding the user's computer or service is being obtained, whether user use patterns are being captured, what the information will be used for, and whether it will be given to others [5]; the only identifying data available are the Internet IP addresses of the machines from which the users connect to the site.

The analysis of a representative period, the month of October 2001, showed that around 9,000 unique machines visited our site (excluding ours) every working day, loading over 30,000 HTML pages and performing over 2,500 requests on our internal search engines (18.3% of our visitors use this tool). During the month, users from 106,691 different computers made 727,482 requests for HTML documents (1,626,825 hits) from this Web site originating from 132 different countries (30.75% from France, 28.15% from USA, 8.56% from Canada, 3.23% from Belgium, 1.95% from Switzerland and only 0.23% from Africa). The geographical location of the connecting machine could not be determined in the remaining 21.78% of document retrievals due to Internet IP addresses without domain name. The average duration of the visits was 8 minutes and 50 seconds. The average number of unique machines that visited the site in one month has almost doubled each year since 1996. The use patterns of RUH Web site are available at the following URL: http://www.chu-rouen.fr/dsii/html/stat.html.

4. Criteria to Measure the Impact of a Web Site

We use the following indicators included in the «Net Scoring» to measure the current impact and potential usage of our site: (a) Web impact factor (WIF) [7]; (b) number of press releases and (c) number of scientific publications about the Web site.

The absolute WIF is the number of sites or pages, which have at least one hyperlink to the site studied. Currently, the RUH's WIF is over 800 sites [http://www.chu-rouen.fr/dsii/html/pointeur.html], including the most prestigious Health resource catalogues (CliniWeb-Us, DDRT-Se, HON-Ch, MedWebplus-Us, and OMNI-Uk). US Altavista (http://www.altavista.com) indicates that there are 10,285 pages with links to the RUH (2001-12-10) after excluding our internal links using the following request: +link:domain-

name.country-code -url: domain-name.country-code ; For the RUH Web site, the domain name is 'chu-rouen' and the country code is 'fr', the formulae is: +link: chu-rouen.fr – url:chu-rouen.fr. This absolute WIF is the highest for any French university hospital [8]. The WIF is reproducible and easy to use: it is possible for anyone to use it to measure the impact of any Web site.

Since 1995, over 200 press articles released information about our Web site without any money being spent on advertising by the RUH [http://www.chu-rouen.fr/dsii/html/presse.html]. The scientific publications and lectures about the RUH Web site (N=45), such as [1, 4, 8, 17-18], are available at the following URL: http://www.chu-rouen.fr/general/pubweb.html.

5. Technical Criteria

The webmaster must analyze the main documents and requests of his/her Web site. They may go further, to include a cost-efficiency analysis of the Web site. Some pages are very time consuming to maintain manually (i.e. the WIF page vs. the Alta Vista request). The success of some pages may remain without an answer: i.e. the number of access of the RUH medical library home page (N=6542 in October 2001) is still a mystery to us.

6. Discussion

The role of the webmaster in determining the success of a Web site has yet to be determined, even in our academic world [3, 9-10]. The following search in Medline using PubMed is surprising: Webmaster is not (yet) a MeSH keyword, therefore we performed the following request in all the fields of the Medline database using the chain "webmaster OR web master" (2002-05-02) and only found 10 relevant references out of 50 (14 contain only the Email of the webmaster and the others were false-positive). On the contrary, a very large number of references (N= 8,709) were found with the MeSH keyword "Internet", although this keyword has only appeared in the MeSH thesaurus since 1999. Among the 10 relevant references about webmastering, one described the role of the webmaster with main similarities with our work as information professionals are defined as main actors in both case studies [11].

Webmaster is a new job opportunity for medical informaticians and medical librarians at least in academic or government institutions. As proposed by Rowlands et coll. [11], we consider that information science professionals are the best choice to become health webmasters in charge of the content of a site as an editor-in-chief at least in academic or government institutions. The authors suggest that they are better fit than computer scientists or Web designers to select and organize information and the content of a Web site because they are both information science professionals. Nonetheless, computer scientists and Web designers have an important role to play on the webmaster team. Physicians and other healthcare providers are also very important in helping determine the content of health Web sites. At the RUH, two physicians are members of the editorial board but information science professionals should undertake the daily management of the health content.

Web designers should define the look and feel of the Web site and the webmaster should make this consistent through the entire Web site. In the e-health business, the authors can imagine other professionals to become predominant in the webmaster team, in particular commercial, marketing and communication people. The webmaster has to train people from his/her institution who wish to create a web site for the public (healthcare professionals and/or patients). At the RUH, this training is systematically performed for every health professional that wishes to develop a Web site. The editorial board and, in particular the

webmaster is also in charge of the follow-up of all Web sites created within the institution and their adherence to quality criteria over time.

Some points are crucial:

(1) improving the use of quality control. The set of criteria to assess the quality of health information should be an indirect indicator of the relevance and the utility of a Web site [4-5]. However studies show that the correlation between the quality of the site and the quality of the medical content itself is still disputed in 2002: We recently proposed a simple criterion to evaluate the quality of the health content [12]: indication of the level of evidence for a 'sensible' document which can be defined as every document published on the Internet from an institution, such as the ministry of health, medical schools and agencies: it includes clinical guidelines, consensus conferences, technical reports and teaching material.
The RUH Web site adheres to most of the «Net Scoring» criteria but not all (i.e. we do not distinguish between internal and external hyperlinks). At the RUH, some improvements need to be made, in particular the editorial review process, which is rated badly because it is too slow according to RUH MDs willing to create content. On the other hand, the design, which was also badly rated, will not be improved because we prefer to optimize the navigability and the time to load pages of the Web site.

(2) structuring information, using metadata to optimize in the future the search of information. At the RUH [13], we follow the Dublin Core initiative [14] with other institutions (see a list at the following URL: http://www.chu-rouen.fr/documed/dc.html).

The role of the health webmaster, as editor-in-chief primarily reading the literature, has not yet been formally established and will need an inter-rater reliability study. We recently performed a study including three medical informaticians which rated 30 teaching resources using ten criteria from the Net Scoring and demonstrating poor agreement among the raters [15]. The webmaster's work is often limited to updating information rather that controlling the content and design of the Web site. The authors consider that the health webmaster should play a major role in the editorial process. Health care organizations are redefining the duties of webmasters as the use of Internet technologies becomes more and more widespread [3].

Using two webmasters (one medical informatician and one medical librarian) may be a convincing reason for the success of the RUH Web site; there is a synergy between these two information scientists [16] even though their views about information is different because of their training and experience. The RUH webmaster team also includes one deputy medical informatician in charge of the technical support and choices, including Java script programming and one deputy medical librarian in charge of the daily management of the Web site (statistics, press releases, WIF).

In our experience, the health webmaster must be (or eventually become) a multidisciplinary team leader. His/her role may sometimes be appreciated as complex and paradoxical because the skills acquired must be numerous and various: (a) web editor in charge of the content and the design of a Web site, following quality criteria to build and update the Web site; (b) web administrator with the technical ability to manage servers and parameter statistical tools; (c) making strategic decisions (i.e. technical choices, such as the place of XML, Flash technology, use of a database for all or part of the Web site) and to perform information and technology watch; (d) web programmer, who writes applications using Internet technologies. The role of the webmaster requires multiple competencies, which can be achieved more easily in a team than individually. This scheme is also used in the Mayo Clinic Web site [3] where there is a team of people managing the Web sites in a collaborative and collegial manner.

Skilled, methodical, organized human reviewing, selection and filtering based on well-defined quality appraisal criteria are key factors for academic institutions such as the Rouen University Hospital or the National electronic Library for Health service [6]. Furthermore, by promoting the application of agreed quality guidelines and codes of ethics by all health information providers, the overall quality of the Web will improve with time and the Web will ultimately become a reliable and integral part of the care profession [6].

In conclusion, webmastering is a new job opportunity in academic and government institutions. We believe that webmastering training will soon appear in the academic courses of information science professionals.

Acknowledgments

CISMeF was supported in part by the grant n° 1998 06 016 from the Agence Universitaire de la Francophonie in the program "French-speaking Virtual University" and the Educnet programme of the Ministry of Research. The authors thank Myriam Quéré and Richard Meideiros for their editorial assistance.

References

[1] Darmoni SJ, Leroy JP, Baudic F, Douyère M, Piot J, Thirion B. CISMeF: a structured health catalogue. Meth Inf Med 2000;39(1):30-5

[2] Condrinet, Content and Commerce Driven Strategies in Global Networks. Building the Network Economy in Europe. Gemini Consulting. DGXIII/E. Available from: URL: http://www.echo.lu/condrinet/

[3] Chin TL. Shifting roles. Health care organizations are redefining the duties of Webmasters as the use of Internet technologies grows in importance. Health Data Manag. 1998 Jul;6(7):22-4, 26.

[4] Darmoni SJ, Leroux V, Daigne M, Thirion B, Santamaria P, Duvaux C. Critères de qualité de l'information de santé sur l'Internet. In: Albert A, Roger-France FH, Degoulet D, Fieschi M, editors. Santé et Réseaux Informatiques. Informatique et Santé. Paris: Springer Verlag France; April 1998. p. 162-74.

[5] Ambre J, Guard R. Perveiler FM, Renner J, Rippen H. Working Draft White Paper: Criteria for Assessing the Quality of Health Information on the Internet,14 April 1999. Available from URL: http://hitiweb.mitretek.org/hswg/

[6] Kamel Boulos MN, Roudsari AV, Gordon C, Muir Gray JA. The Use of Quality Benchmarking in Assessing Web Resources for the Dermatology Virtual Branch Library of the National electronic Library for Health (NeLH). Journal of Medical Internet Research 2001;3(1):e5. Available from URL: http://www.jmir.org/2001/1/e5/

[7] Ingwersen P. The calculation of Web impact factor. Journal of Documentation 1998; 54(2): 236-43.

[8] Darmoni SJ, Thirion B, Douyère M, Challoub C, Leroy JP. Mesure de l'impact des sites Web : le Web Impact Factor. L'exemple des CHU français. Rev Prat - Médecine Générale 2000;14 (516):2079-80.

[9] Kleinoeder T, Jahn U, Rienhoff O. The need for evaluation when managing the imia.org Web-site. In: Kokol, Zupan, Stare, Premik, Engelbrecht, editors. In: MIE 99. Proceedings of the Fifteenth International Congress of the European Federation for Medical Informatics; 1999. p. 543-6.

[10] Redalen A, Miller N. Evaluation Website modifications at the National Library of Medicine. D-Lib Magazine 2000; 6(1). Available from: URL: http://www.dlib.org/dlib/january00/redalen/01redalen.html]

[11] Rowlands J, Forrester W, Coelho L, Cardy L, Yeadon J. Opportunities on the Web: a role for information professionals, using the development of the BMA Library Online Service as a case study. Health Info Libr J 2001 Mar;18(1):45-53.

[12] Darmoni SJ, Haugh M, Lukacs B, Boissel JP Quality of health information about depression on internet: Level of evidence should be gold standard. BMJ 2001; 322(7298):1367. Available from URL: http://www.bmj.com/cgi/content/full/322/7298/1366#resp1

[13] Darmoni SJ, Thirion B, Leroy JP, Douyère M, Piot J. The Use of Dublin Core Metadata in a Structured Health Resource Guide on the Internet. Bull Med Libr Assoc 2001; July;89(3) 297-301.

[14] Weibel S, Juha H. DC-5: The Helsinki Metadata Workshop; A Report on the Workshop and Subsequent Developments. D-Lib Magazine 1998. Available from URL: http://www.dlib.org/dlib/february98/02weibel.html.

[15] Darmoni SJ, Le Duff F, Joubert M, Le Beux P, Fieschi F, Weber J, Benichou J. Assessment of a French Code of Ethics for health teaching resources on the Internet. MIE 2002 (in press).

[16] Braude RM. Medical librarianship and medical informatics: a call for the disciplines to join hands to train tomorrow's leaders. J Am Med Inform Assoc 1994; 1(6):467-8.