

Intranet and HTML at a major university hospital

- experiences from Munich

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Abstract. Intranet-technology is the application of Internet-Tools in local networks. With this technique electronic information systems for large hospitals can be realized very easily. This technology has been in routine use in 'Klinikum Großhadern' for more than one year on over 50 wards and more than 200 computers.

The following clinical application areas are described: drug information, nursing information, electronic literature retrieval systems, multimedia teaching und laboratory information systems.

1. Introduction

Availability of up-to-date information is a real challenge in a big hospital. Using paper-based communication, this goal cannot be achieved with a reasonable effort. The drug list of our local pharmacy for example contains more then 1000 drugs and is revised several times a year. The nurses need information about more than 200 diagnostic and therapeutic standard procedures; the department of clinical chemistry offers more than a thousand laboratory procedures. With an electronic information system on the wards the necessary information can be provided up-to-date. HTML-based systems are easy-to-use and efficient.

2. Technical background: Access to databases using Intranet-technology

Because the data (e.g. drug data) is complex and extensive, it is reasonable to use a database. Flexibility and ease-of-use is an important issue; for this reason an HTML-based system has been chosen. The information is stored in a relational database; the user sends his queries with a WWW-Browser (e.g. Netscape Navigator®, Internet Explorer®) to a WWW-Server (e.g. NCSA-/Apache-/Netscape-/Oracle-Webserver). The Server queries the database and sends the result back to the user.

By collecting the Log-File of the WWW-Server it is possible to evaluate which information is asked most frequently and from which computer. This is important to improve the quality of the service.

3. Drug information

The *local drug list* contains all drugs which are in regular use at our medical faculty. It covers around 1000 different drugs, which are structured in groups of indications using the ABDA-system. The list has generic and proprietary names, information on how to administer the drug, the price and a comment text.

This service is queried approximately 500 times a month, see [4].

The *Rote Liste*® [2] is the directory of all drugs which are manufactured by companies of the 'Bundesverbandes der Pharmazeutischen Industrie' (association of German pharmaceutical companies). It covers around 9000 drugs and contains proprietary and generic name, indication, side effects, interactions, contraindications, dosage, administration and references.

The *Rote Liste*® is queried around 1500 times a month and the ratio of nurses to doctors is about 5:1.

Our pharmacy has around 70 self-produced articles. The information on how to use these products is published in our intranet.

4. Nursing information

The nursing service at the Klinikum Großhadern employs about 1200 people and trains around 60 - 70 new nurses each year. The nursing service has developed an extensive collection of information about medical procedures and hygienics (approximately 400 pages). This nursing information is divided into different sections such as endoscopy and radiology and contains an overview of the medical procedures such as colonoscopy and phlebography. Each sheet has three parts: 1) the administrative data (e.g. telephone number, schedule, required records etc.); 2) the necessary preparation of the patient (e.g. dosage of laxatives); 3) how to take care of the patient after the procedure (e.g. check for vital signs). The nursing information is provided with the 'Pflegeinformationsnetz' (network for nursing information). There are about 3200 requests to this system per month.

5. Electronic literature retrieval systems

The library of our university provides on a central server a collection of medical databases (Medline®, Embase®, Current Contents®). These databases can be queried with a WWW-interface (Webspirs®). Using intranet-technology this external information source can be integrated very easily.

In addition there is a separate system for Medline with Knowledgefinder®.

Recently more medical books are published as CD-Rom, usually containing single-user, platform-dependent programs. In a large hospital with many different computers, such solutions are useless and client-server technology is required. For this reason we cooperated with a medical publisher who provided two well-known books in raw data format; we successfully converted these books to HTML and they are now on-line on our Intranet.

6. Multimedia teaching

By converting the existing teaching material for medical students to HTML (*online-script*), recent versions can be provided. E.g. a textbook of clinical chemistry has been converted to HTML. By this means our students can access this information from any computer within the medical faculty. The major advantage of this approach, in the context of teaching, is that for each topic there can be links to more detailed contents; the student can find the information fast and explore as deeply as needed.

By cooperation with Dartmouth Medical School and the Technical University of Munich (neurology) a set of *interactive learning programmes* has been developed (e.g. Parkinson's disease) using intranet-technology. Text, graphics, audio and video have been integrated. A carefully controlled study from Dartmouth Medical School showed that CBI (computer based instruction) can improve learning efficiency [5].

7. Laboratory information systems

The service of clinical chemistry of our faculty offers more than a thousand different analyses. For each parameter there is a reference value and a comment (how to interpret results, common errors etc.). With an electronic list for procedures in clinical chemistry it is possible to provide the most recent information on the wards.

8. Future directions and conclusions

Similar to the service for clinical chemistry, we want to provide relevant medical information for other departments on our intranet-server. Access to patient records using intranet-technology is under development in our hospital. The extensive use of our intranet-server indicates that there's a need for such information systems on the wards. Physicians and nurses must, however, be trained to use these services.

9. Summary

Five areas of HTML-applications using intranet-technology were presented, which are in routine use in our hospital: drug information; nursing information; electronic literature retrieval systems; multimedia teaching and laboratory information systems. For a more detailed description see [3].

The basic concept is an integration of commercial databases and local information. All applications are hardware-independent with the same user-interface and all use client-server-technology. By a central update it is ensured that everybody gets the most recent information.

As a result of these efforts synergy has developed, communications have improved and we are cutting costs. The training of the medical staff is supported which helps to improve the care of the patients.

10. References

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