Math-Net
a model for information and communication systems in sciences

Wolfgang Dalitz, Wolfram Sperber, and Winfried Neun

Konrad-Zuse-Zentrum für Informationstechnik Berlin (ZIB)

1 Introduction

A homepage is the Web entry point and a signpost to a Web site (other common terms therefore are "portals" or "sitemaps"). Web sites of (mathematical) departments consist of collections of interrelated information of the institution. A clear and intuitive structure of the homepage is essential for a user-friendly navigation and search. In fact, however, the structure of department homepages differ essentially. Taking this into account the Math-Net Page for departments, in the following context called Math-Net Page, is a concept for a standardized "secondary" homepage of a mathematical institution.

2 The Math-Net Page

Typically Web sites of a department contain address information, an overview about the institution, research publications such as preprints, documents about teaching, information about libraries and so on.

2.1 The Aim of the Math-Net Page

The Math-Net Page is mainly a standard portal to that core information offered by a department. Actually it contains the relevant information of the department and, beyond this, provides access to the "overall" Math-Net Services. The Math-Net Page is realized as an additional homepage for the Web site of a department with a (nearly) uniform structure, notation and design. It is *not* a substitute for the homepage of the department. As a matter of standardization it should have a prominent link to the departmental homepage.

The main aims of the Math-Net Page are:

– to provide a user-friendly entry point to the local information for the human user

– to provide a standardized entry point for search engines to the information offered by the department

The Math-Net Page should be uniform in appearance and reflect its structure in an intuitive way (cf. the above fig.).

Table 1: Math-Net Page of University of Cologne (with standard labels)

2.2   The Structure of the Math-Net Page

The Math-Net Page is divided in two partitions

– The links to the local information are located in the upper right side of the page. The links to further local information are realized by a toolbar on the right side (*horizontal integration*). Particlularly, this covers

– A link to the homepage of the department (if existing)

– a link to the homepage of the university,

– a request to the local search engine if exists.

– The links to (overall) Math-Net Services are realized by a navigation toolbar on the left side of the Math-Net Page (*vertical integration*). Vertical integration means the embedding in a mathematics-specific information- and communication system.

The local information will be classified by the following elements **groups** (in the blue rows) and *categories* (in the grey rows):

2.3   Elements of the Math-Net Page

The categories of the Math-Net Page are not disjunct in mathematical sense. There is a semantic overlapping between the various categories of the Math-Net Page, e.g. between the categories *Beginner's Guide*, *Math and School* and some categories of the group Teaching.

Moreover the above elements define the following RDF schemes

– Math-Net Subject Scheme (see http://www.iwi-iuk.org/material/RDF/1.1/scheme/ Subject/) and the

– Math-Net Type Scheme. (see http://www.iwi-iuk.org/material/RDF/1.1/scheme/Type/)

Math-Net Subject Scheme and Math-Net Type Scheme classify the information by subject and type.

The elements are "signs" (hyperlinks) to the information content of the Web site. The destinations of the links could be single Web documents, lists of such or local search engines.

2.4   Identifiers, Labels and Standard Labels of the Elements

In the following we will discuss more technical aspects of the Math-Net Page.

As said above, a Math-Net Page should be machine understandable and an intuitive help for the human user, too. These are two different requirements:

The first requires unique metatags for each category (called identifiers below).

The second requires intuitive labels for the categories which can be easily understood by the user.

Identifiers

Identifiers are necessary for the interpretation of electronic documents by machines. Here pseudo-verbal term are used as identifiers: e.g. <G1> or <aboutUs> for the category "About us".
For the exact definition of the identifiers see the Application Profile for the Math-Net Page (see http://www.iwi-iuk.org/material/RDF/1.1/profile/MNPage/).

Labels

Labels are the visible names of the groups and categories.
Of course Math-Net Member Associations (or Math-Net Member if the Math-Net Member Association is not founded yet) should provide Math-Net Pages in their mother tongue language(s) to their users.
So the only condition for labels is the keeping of the semantics of the categories, which is defined in table 1. As a consequence the notation of the Math-Net Pages may differ significantly. There is no possibility and no need to prevent such a development. The important and unique relation between visually different pages is given by the identifiers and possibly a set of standard labels discussed below.

Standard and Alternative Labels of Groups and Categories

Standard labels are special labels in a "common understandable" English.
The standard labels should made visible to users on a special Math-Net Page, the so-called "Standard Math-Net Page".

The Standard Labels of Groups and Categories used on the Math-Net Page are defined in table 1. We denote all other labels as alternative labels

3   The Math-Net Page Maker

The Math-Net PageMaker is a tool to generate and change Math-Net Pages in an easy way. The PageMaker produces both: the html Math-Net Page and the metadata. The metadata are described as a RDF scheme (therefore in XML syntax), XHTML is the markup language for the visible Web-page. The Math-Net PageMaker uses UNICODE UTF-8 character set to avoid problems with different character sets.

More detailed, the Math-Net Page Maker is a set of forms which are necessary for creating and editing Math-Net Pages. You have to choice between foor modes:

– create a Math-Net Page with standard labels,
– change an existing Math-Net Page with standard labels,
– create a Math-Net Page with alternative labels,
– change an existing Math-Net Page with alternative labels.

Then you get som input forms for each mode. The data which are arranged in blocks:

1. data of the information coordinator
2. general data of the institution
3. further data
4. links from the Math-Net categories to the correponding directories/documents

3.1   Data of the information coordinator

Each institution taking part at the Math-Net initiative must have an information coordinator. She/he is the contact person for all Math-Net activities of the department. Especially, the local information coordinator is responsible for the local information offered by the department.

Most input fields in this block are mandatory: the name, the e-mail, the phone number. Title and fax number are optional.

3.2   General data of the institution

General data include: name of the university and name of the institution, the address and, if existing a logo. Moreover, it is possible to insert the request to a local search engine. Therefore some parameters are to specify between the <form> and <form>-tags in HTML syntax. Particularly, the parameters cover

– method:
   "GET" or "POST" are different methods for the transfer of the parameters from the request to the search engines.
– action:
   URL of the search engine
– further (possibly hidden) parameters:
   e.g. buttons for the start of the request, buttons for the maximal number of hits, the specification of the broker, ...

The parameters depand on the local configuration of your local seach engine. Please contact the administrator of the local search engine for more information.

Further data

Further data are the country code, the region and the used character set. Country or region-specific services are part of Math-Net Services. These services are linked in the left column of the Math-Net Page.The input of the country code is necessary for generating the left column of the Math-Net Page. E.g., regional services can be offered in the left column. Math-Net Member Associations are essential for the communication within Math-Net. Therefore the data Math-Net Member Association is a essential date.

International information and communication systems should allow multilingual documents. Multiple character sets used in a single documentare a problem for handling. Math-Net uses Unicode UTF-8 as basis character set. "any2utf8" is a converting tool in Math-Net for a transforming for the most converting tools to UTF-8. The field "character set" specifies the character set used by you as a basis for transforming. The information contained in the metadata part of the Math-Net Pages is processed in Math-Net Services. Requests to the services have to be transformed in UTF-8 and the output has to be converted in the character set used by the user. It is possible to restrict the use of UTF-8 to the metadata part. This could be useful if all other documents on your server use an other character set (then the user would have to to switch between different character sets). For that reason the Math-Net Page Maker has a button to restrict the usage of Unicode to the HTML part.

Local Links

The local links are the core of the Math-Net Page. The categories contain the links to the categories described in detail above.
Moreover the Math-Net Page allows the links to further local Math-Net Pages e.g. in other languages. Principally, the number of Math-Net Pages is not restricted. Practically, we have restricted it up to 3 further Math-Net Pages.

Registration of Math-Net Pages

Please start your Web browser for generating Math-Net Pages. The URL of the Math-Net Page Maker is: http://elib.zib.de/cgi-bin/mpm.cgi
Generated Math-Net Pages will be send out automatically to the e-mail address of the local which is a mandatory entry in the Math-Net Page Maker. The local information coordinator has to install the Math-Net Page(s). Normally, the Math-Net Page with the standard labels should be installed at the URL

URL of the server of the department /math-net
for the Math-Net Page with standard labels. Math-Net Pages with alternative labels should get the same URL with an additional suffix defined by you:

URL of the server of the department/math-net_suffix.
Please inform the

Math-Net Initiative if you have installed a Math-Net Page and send the URL to us. This allows a fast integration of your department in some Math-Net Services, see also Math-Net Services and Math-Net Pages.

A change of an existing Math-Net Page is possible by giving the URL of the local Math-Net Page which has to be changed.

4   Math-Net Services and Math-Net Pages

Math-Net Pages are the basis for several Math-Net Services especially the services: Navigator and SIGMA.

The Math-Net Members are listed in the Navigator. The Math-Net Navigator provides different views to all institutions having Math-Net Pages, e.g. views in countries and regions or lists of the information coordinators of the institutions. The views of the Math-Net Page Maker will be generated directly from the Math-Net Pages.

SIGMA is a search engine over the whole information in Math-Net. SIGMA collects information from all Math-Net Members and index it.