Integrating distributed expertise: The Subject Guide of the Physics Virtual Library ViFaPhys

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Background

As a response to the information overload produced by the Internet, subject-based virtual libraries such as the Physics Virtual Library provide subject-specific gateways to scientific information: the development of these virtual libraries is initiated and funded by the German Research Foundation DFG in the „Electronic Publications Offered by Scientific Libraries"-programme.

So the Physics Virtual Library is a central access point to information and information services relevant to physicists. Provided resources are mainly accessible via the Internet.

The ViFaPhys includes several modules displayed by the Homepage of ViFaPhys.

The modules

The **Subject Guide** contains collections of information and information resources, as will be shown in detail.

The **Databases** module that aims at facilitating access to relevant technical literature will provide a meta search engine that will allow simultaneous searching in the next future. Further services like TIBORDER or GetInfo are integrated to supply customers with full texts in a comfortable way.

The Subject Guide

As just has been mentioned: the Subject Guide of ViFaPhys includes collections of information and information resources but no single documents: So we consider resources like

– link compilations,
– collections of technical literature,
– collections of software,
– information on and from organisations,
– research projects, and
– conferences.

Because of

– the intellectual selection of the resources to be included,
– regular checks of the availability and of the quality of contents of the resources included,
– short descriptions that characterize contents and services of each resource, and
– because of the fact that resources are displayed sorted by subject and by resource type,

the Subject Guide is a clearly-organised up-to-date compilation of evaluated and commented resources.

Just one example: If you need references to resources of scientific and technical data concerning atomic and molecular physics, you surely will find them in the ViFaPhys' Subject Guide, but how?

Clicking on the Subject Guide entry you first get a list of subjects from which you choose the subject of interest, in our example atomic and molecular physics. Then you can specify the category of information you are looking for: In our case scientific and technical data which is

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part of the Technical Literature category. As result a list is displayed showing resources of scientific and technical data concerning atomic and molecular physics.
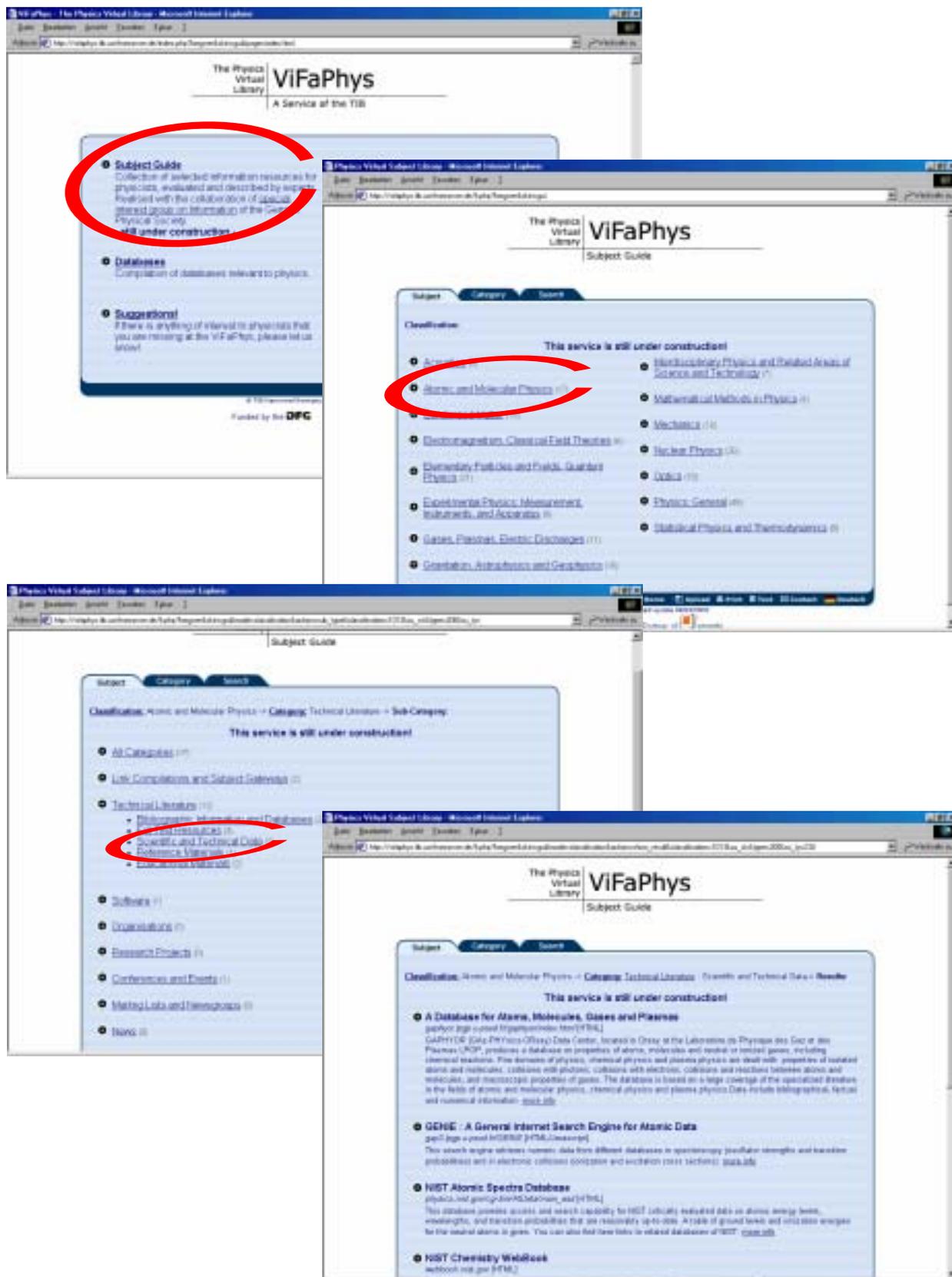

Figure 1: Using the Subject Guide of ViFaPhys

The integration of distributed expertise
In order to ensure the quality of resources provided by the Subject Guide scientists evaluate their content and services. This involvement of scientists is the central aspect of the ViFaPhys project: it is organised by the Special Interest Group on 'Information' of the German Physical Society, in German: Arbeitskreis Information short AKI. The AKI is engaged in questions of scientific information and communication in physics and supports the ViFaPhys by organising the integration of experts evaluating resources: not only using its contacts to physics departments in Germany but also establishing the technical infrastructure to manage the evaluation workflow. So the AKI is the central partner of the project that is coordinated by the German National Library of Science and Technology TIB. The TIB is responsible for providing full texts for physicists and is experienced in developing virtual libraries such as the Engineering Subject Gateway ViFaTec as archetype of ViFaPhys.
The Institute for Scientific Networking ISN Oldenburg experienced in maintaining Internet-services for physicists implements the web server of ViFaPhys.
The INSPEC database is included in cooperation with Fachinformationszentrum Technik.
FIZ Karlsruhe is an important provider of further information services for physics.
Scientists are involved in the ViFaPhys as members of the project's scientific advisory board: the scientific advisory board has to survey the project and the progress and development of services of ViFaPhys. It assists the project in subject-related issues. This expert advice guarantees consideration of specific needs of physicists during the conceptual design of ViFaPhys.
As experts scientists select and evaluate information sources to be included in the Subject Guide. But what is our motivation to involve scientists? The reason is that especially scientists are qualified to judge the relevance of a resource and to evaluate its content. Thus the integration of scientists is crucial for getting the Subject Guide's quality.
Now, where do the experts come from? We asked scientists from physics departments, scientific research centres, divisions of the German Physical Society and subject librarians to participate. For registration they send a form to the speaker of the AKI giving their research area. This information is used to set up an experts database that allows us to designate the appropriate expert to a resource.
Even though most of the scientists we asked are interested in participating, they hesitate to register because they worry about the amount of work to be done evaluating and describing resources. But we can put them at ease: formal descriptions are already entered! So evaluation of resources means just a small time investment. An expert only judges the relevance of a source and decides if it should be included. He designates the exact category of the physics and astronomy classification scheme PACS and determines the intended audience of a resource. Though these steps are very fundamental and important to ensure the quality of the Subject Guide, they won't be a problem to scientists familiar with their subjects, in many cases the resources that have to be evaluated may be well known. At the moment about four resources were submitted to each expert. And: as the Subject Guide will only consider absolute high-score resources, the number of included resources is restricted to some hundreds or a few thousands. So supporting the Subject Guide by evaluating resources means just a small time investment but results in a jointly maintained, quality controlled collection of physics resources with – another important aspect – continuity that is ensured by the TIB. The benefits for the physics community that result from this collective work must be stressed more in future.
Just one example how evaluated resources do look like in the Subject Guide: They include the PACS notation and intended audience stated by the expert.
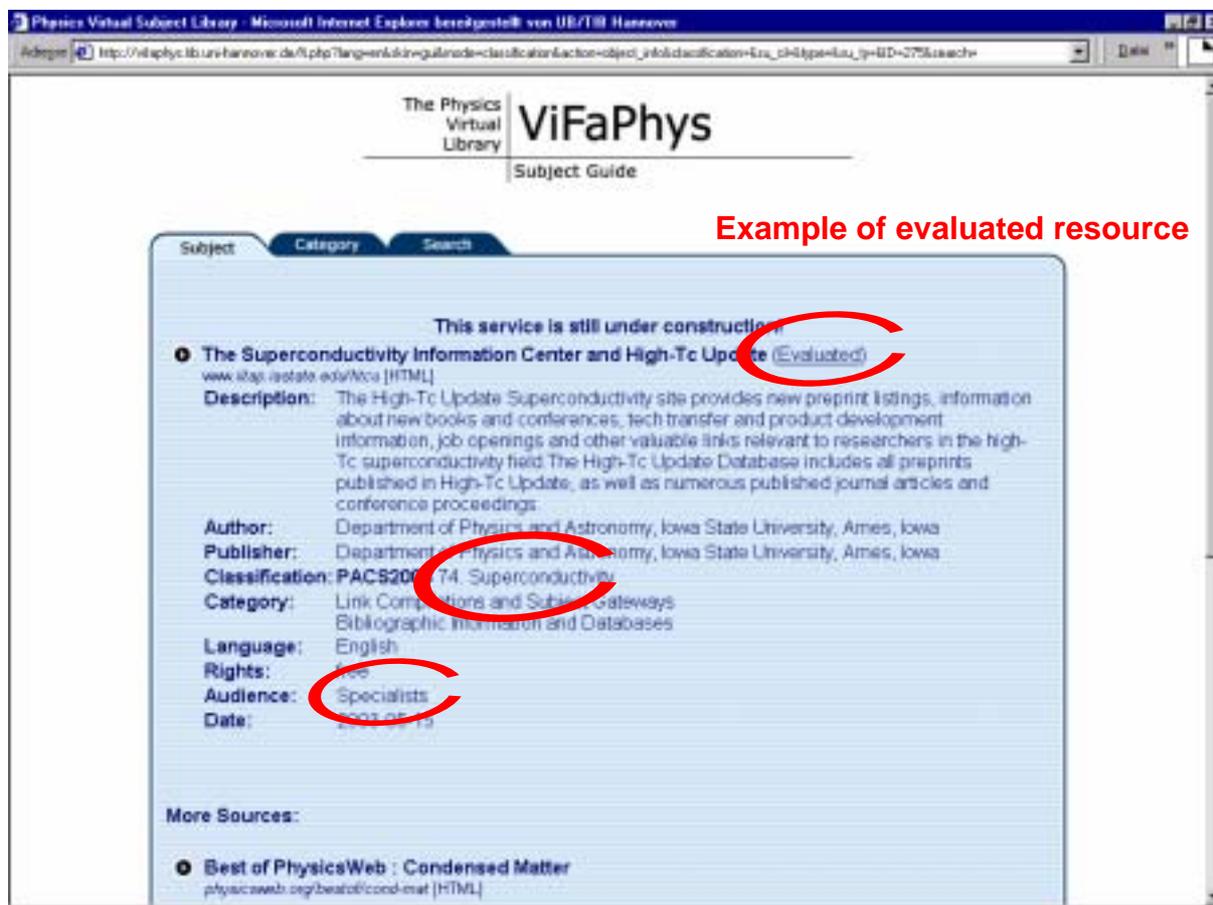
Figure 2: Evaluated Resource

So far we only explained what kind of expertise we want to integrate and why this integration is crucial for the Subject Guide. But how do we organise this integration of expertise that is distributed in physics departments etc.? Or more precisely: what is the technical background of the integration of distributed expertise.

First of all there are some security standards to be respected:

Functions are separated: we operate a dedicated Web server to present the ViFaPhys and its Subject Guide to the user. This server includes a database that contains the resources to be shown by the Subject Guide. This server uses normal TCP/IP.

A restricted work area on a second server is installed to manage the integration of distributed expertise. To ensure data security, especially data integrity, but also confidentiality, we operate it as a Secure Socket Layer server, a web server that uses the secure hypertext transfer protocol https encrypting data. Aspects of authentication in the sense of access control are implemented within the database software. We use standard open source software such as Apache and OpenSSL as server software. The database is a MySQL. Scripts are written in PHP 4.

The workflow

Now let's have a look at details of the workflow that allows us to integrate distributed expertise:

We see the separation of the two servers and databases originating from their functions. New resources are fed into the work area database using an online form. Access is controlled via user name and password. The experts database gives the name of an appropriate expert. If there are several experts responsible for one subject area, resources are equally distributed among them. The expert that has been selected gets an email containing the request to log on the working server of ViFaPhys where new resources to be evaluated are stored. The first time an expert has to evaluate resources he or she gets the URL of the login page and defines his password for future logins. After the expert had logged in, a short list of resources to be

evaluated is displayed, clicking on the respective URL brings him to each resource, so he easily can have a look on it. If he wants to enter his decision on a resource, he clicks "Evaluieren" and has to answer the central question whether the resource should be included or not. If he decides that it should not, he has to specify the reason why. If he is of the opinion that is has to be included, a pre-filled form is displayed containing nearly every data, especially the formal descriptions. After his fundamental decision on the relevance of a source, the expert now only has to enter the PACS notation and the intended audience. A dump of the work area database is regularly generated to update the contents of the database
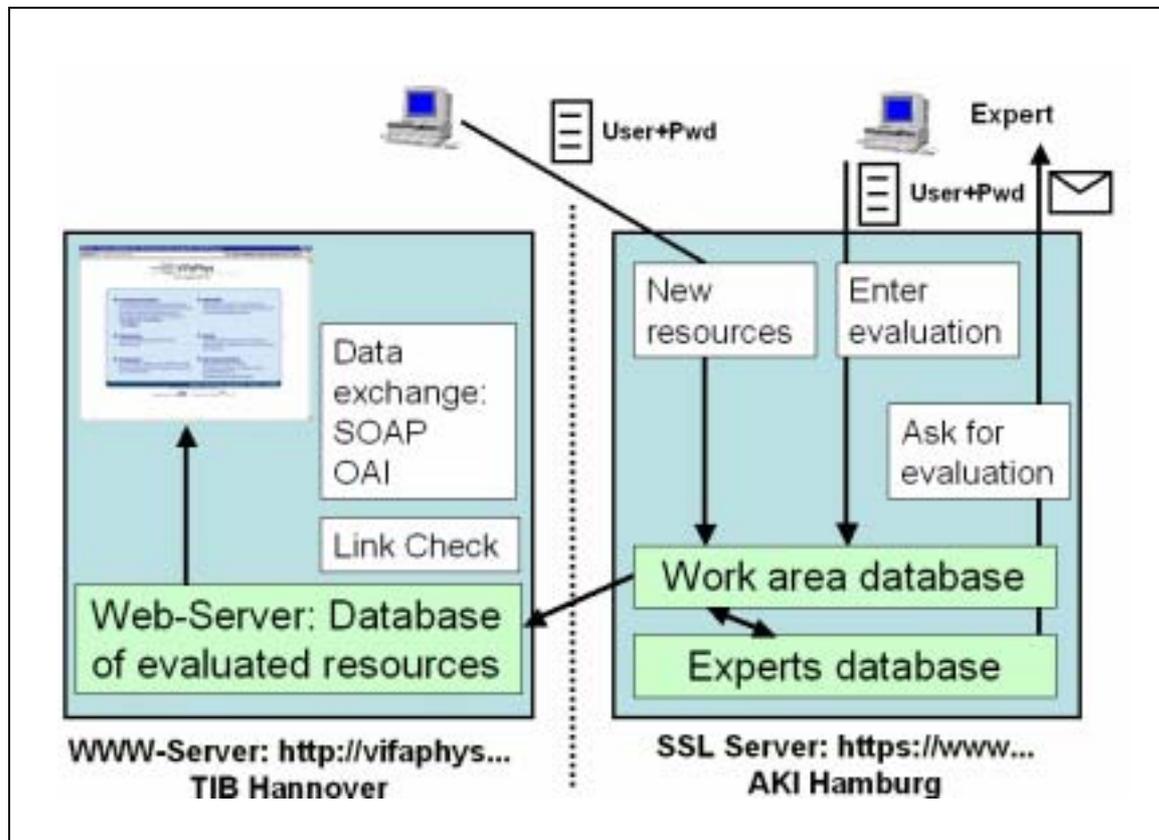

Figure 3: Workflow and Modules

of evaluated resources feeding the Web server.

This part of the Subject Guide and its Workflow includes modules to perform regular link checks and – beyond the conventional HTML pages – provides additional interfaces to allow for data exchange with external services:

To integrate the contents of ViFaPhys' Subject Guide into the search function of vascoda, an internet-portal which offers a central access point to a wide array of scientific and scholarly information in Germany the ViFaphys provides a SOAP based Web service.

To serve an open standard the ViFaPhys uses the OAI-PMH (Protocol for Metadata Harvesting) 2.0 and is registered in the OAI database of conforming repositories. By this way the OAIster Search provided by the OAIster project of University of Michigan Digital Library Production Services includes our metadata.

Some more details concerning the WWW Server: The server itself is implemented by the ISN Oldenburg using standards such as MySQL and PHP. In order to provide an easy to access and comfortable to use service, appreciated by the scientists, we respect some basic principles of web programming according to the demands of physicists, such as: no frames!

As we do without unnecessary pictures or graphics, we get short page load times. By providing a text-only version, the ViFaPhys is accessible to people with disabilities especially

blind and visually impaired users. The ViFaPhys WWW Server is robot friendly, each page may be bookmarked. Presentation of contents and navigation is organised as self-explanatory as possible. And last but not least the modular design of the Server allows for easy and uncomplicated modifications.

Summary
Scientists integrate their expertise to support the ViFaPhys
– concerning fundamental concepts of ViFaPhys:
  Members of the scientific advisory board assist the ViFaPhys with their knowledge not only on subject specific questions, but also on issues of scientific information and communication in the physics community as the Special Interest Group on 'Information' AKI of the German Physical Society does.
– evaluating the contents of the Subject Guide:
  The AKI organises the integration of scientists as experts evaluating the contents of the Subject Guide by using its contacts to scientists, and by providing the technical infrastructure needed.