

## About UNESCO Virtual Laboratory Toolkit

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### Abstract

The purpose of the UNESCO Virtual Laboratory CD-ROM Toolkit, developed with the help of the Abdus Salam ICTP, is to provide information and free software tools relevant to the creation of a Virtual Laboratory. This Toolkit should enable scientists in developing countries to establish and participate in basic Virtual Laboratories.

### Introduction

The dream for the Web of Tim Berners-Lee [1], its creator, has two parts: in the first place, he sees the Web becoming a much more powerful means for collaboration among people. And in the second, collaborations extends to computers. Machines becoming capable of analyzing all the data on the Web - the contents, links and transactions between people and computers ("Semantic Web"). In the first context, to promote research and education in developing countries, and so to help reducing the technology gap of the digital divide, the Virtual Laboratory (VL) Approach can also be a good starting point to achieve these challenges.

VL are 'Electronic workspaces for distance collaboration and experimentation in research or other creative activity, to generate and deliver results using distributed information and communication technologies'. This is a more general definition than Collaboratories (or, 'center without walls'). Similar to the nature of collaborative work, the idea is to create something more than the simple sum of individual efforts.

VL are emerging, for example, in the vast international human genome project, the planned construction of long-baseline interferometry laboratories and global observation networks for the environmental and social sciences. The tools employed are increasingly adapted to health/medical applications and to creative activities in the social sciences, the humanities and the arts.

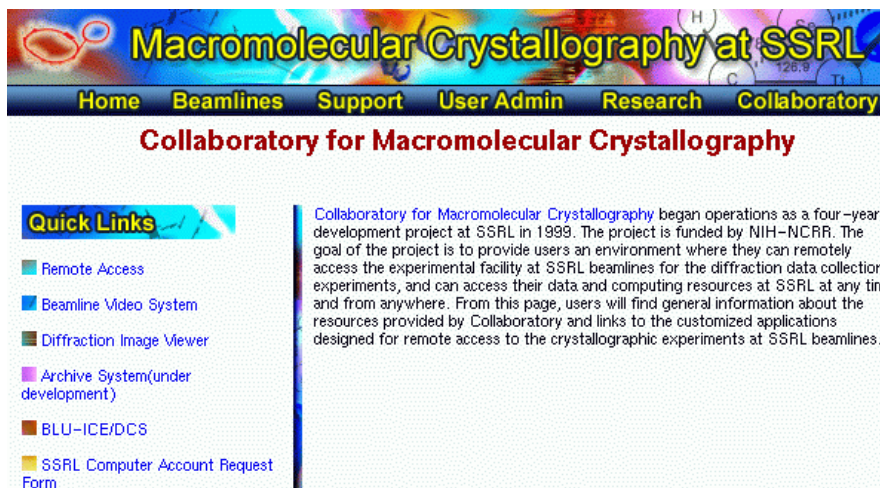


Fig. 1: SSRL - The Stanford Synchrotron Radiation Laboratory at <http://smb.slac.stanford.edu/collaboratory>

In principle, equitable access of developing country scientists to VL holds promise for enabling them to fully participate in and benefit from international scientific research, providing that such VLs take account of the economic and infrastructure constraints of the 'digital divide'. This objective has been adopted by UNESCO, on the basis of study of the characteristics and challenges of VL and their role in development [James P. Vary (ed.) 'Report of the Expert Meeting on Virtual Laboratories', organized by the International Institute of Theoretical and Applied Physics (IITAP), Ames, Iowa, 10-12 May 1999. Paris: UNESCO, 2000 (CII-2000/WS/1)]. [2,3]

## Person-to-person Communication Tools

We at the Abdus Salam, in collaboration with the National Information Technology Development Agency (NITDA) of Nigeria have participated in the identification, evaluation, installation, configuration and test of the person-to-person (P2P) communication tools for the UNESCO VL Toolkit. The conventional techniques of human interaction are usually carried out via conversations, telephone calls, books, TV, or letters. The computer-supported equivalents are, respectively, videoconferences, Internet telephony, the WWW, and e-mails comprising a whole class of P2P communications.

The free software tools available for this P2P class and included in the Toolkit are:

- P2P Manager, which is a P2P Call Setup and Management tool for all other p2p tools also included in the VL Toolkit developed by one of the Authors.
- Jabber Instant Messaging
- Gnomemeeting for Linux (H323 Video Conferencing)
- Network Text Editor
- RAT audio conferencing, offering good quality audio at low speed.
- ScientificTalk Web chat, which support Mathematical symbols display, graph plotting and LaTeX. It is a open source project of the Authors for a standard multiway graphical Web chat . This Perl-based application is portable across platforms and while chatting on-line, it converts textual input or standard LaTeX--a popular computer language for composing formatted scientific text for high-quality printing into HTML. The math displayed on the browser is rich because of the LaTeX typesetting powerful TeX-to-HTML translator, tth. Recent versions of ScientificTalk also allows sophisticated mathematical notation via MathML.



Fig. 2: ScientificTalk Logo

- SDR - Session Directory Tool, MBONE Conferencing, Multicast Session Browser and Call Setup tool.
- VIC video conferencing, offering good quality video at low speed and frame rates.
- VNC desktop sharing or Virtual Network Computing.
- UNIX Talk/WinTalk, text chat, the standard UNIX Talk client and WinTalk for MS Windows.
- WhiteBoard Tool, supporting PostScript images.

Additional Software Tools also include

- CMS Content Management System.
- Hypermail, creates HTML archives of mailing lists.
- Jabber Instant Message Server for the Open Source Instant Messenger.
- jetspeed, Enterprise Information Portal (Java Servlet).
- Mailman, management of Internet mailing lists.
- Majordomo, management of Internet mailing lists
- WebCal Perl, Group Calendar.

## Remarks

On a technical level [4], open source technologies provide a cost-effective alternative for promoting distant electronic collaboration. For example VL, based on the Linux O.S., and the use of digital (wireless) communication tools can help reduce scientific isolation, while filling the need to transfer knowledge to-, and from-, countries in less developed geographical areas in an unprecedented way. Open source software (OSS) is usually freely distributed under the GNU General Public License (GPL).

While free, this does not mean free in terms of support, training or administration. OSS is also particularly interesting in relation to VL environments since it is itself created in a VL. Distributed authors coordinate their work via the net with tools like CVS and Bugzilla.

The framework of collaboration uses ICT for communicating with others, assumes active roles in the learning process rather than passive roles of being a recipient of information (as transmitted, e.g., by a teacher, textbook or broadcast). Important factors to consider are the human diversity, generational differences, and human relations based on the geographical location (and hence time difference) of partners in the virtual sessions. The electronic realm should meet the needs of the whole virtual community, old and young, avoiding an overload of information, asynchronous and unnecessary usage

complications.

The administration of virtual laboratories should be simplified so that they can be run by scientists for the scientists in their own countries.

When considering collaborative projects to be generated within VLS it is not the number of partners, nor the method of organization that matters, but rather it is the principals of (multi-)cultural awareness, and mutual respect between participants upon which the project is to be based.

## References

- [1] Taken from: UNESCO's Courier, September 2000.
- [2] [http://www.unesco.org/webworld/portal\\_freesoft/Software/Virtual\\_Laboratory](http://www.unesco.org/webworld/portal_freesoft/Software/Virtual_Laboratory)
- [3] <http://virtuallab.tu-freiberg.de>
- [4] E. Canessa, C. Fonda and S.M. Radicella, "*Virtual Laboratory Strategies for Data Sharing, Communications and Development*", Data Science Journal, Vol. 1 (2), August 2002. Available at: <http://www.datasciencejournal.org>