Technology Brief

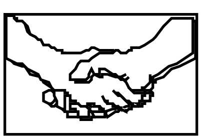
The Collaboratory Concept

Pacific Northwest Laboratory
Operated by Battelle Memorial Institute for the U.S. Department of Energy

The Collaboratory Concept

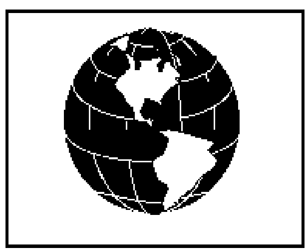
A Collaboratory is an open meta-laboratory that spans multiple geographical areas with collaborators interacting via electronic means - "working together apart." Collaboratories are designed to enable close ties between scientists in a given research area, to promote collaborations involving scientists in diverse areas, to accelerate the development and dissemination of basic knowledge, and to minimize the time-lag between discovery and application. The Collaboratory concept of an enabling collaborative environment can be applied to diverse areas including:

- experimental and computational research in the biological and physical sciences
- clinical medicine and medical information systems
- computer and information sciences
- collaborations in the humanities.



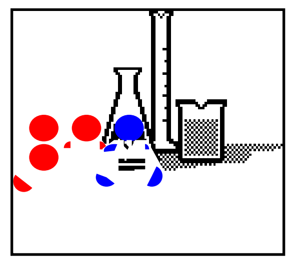
Status

Pacific Northwest Laboratory (PNL) is developing the concept of the Collaboratory as applied to environmental and molecular sciences, with an understanding that many of the required developments will be generic and are applicable to other areas of scientific research and development. The goal is to increase the efficiency of research, reduce the time required to implement new technologies, decrease the costs of current projects, and allow more complex tasks to be undertaken. The Collaboratory will establish and support an electronically linked community of scientists involved in research and development of innovative technologies. This same process of electronically enhanced collaborative science can be brought to medicine and other sciences.



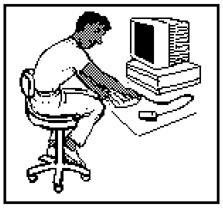
Collaborative Technology

Collaboratory development relies heavily on computer and communications technologies. These technologies allow, or will soon allow, connection by voice, video, interactive 'whiteboard.' and virtual reality, supporting remote experimentation and analysis from a desktop workstation. A successful collaboratory development effort will need a wide range of expertise to explore these areas. Success will also require tailoring the application of these technologies to the needs and wants of scientists. Having a close collaboration in place between research and computer scientists will help ensure that the best technology is applied to the most pressing problems.



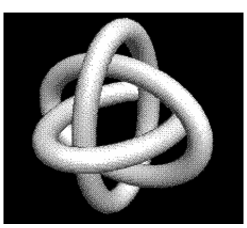
The Sociology of Collaboration

Psychosocial issues, often overlooked in discussions of collaboratories, are also of vital importance. Scientists' perception of being part of a group, even when geographically separated, will depend not only on communication technologies, but on the ability to develop working relationships and friendships, to have informal chats, and on all of the other ways people develop a common sense of purpose. Such dispersed groups may also have to be funded and managed in a new manner, and credit for the group's work must accrue to all of the group's members. Only with the guidance of experts in human factors and cognitive science, and the active support of management, can the full promise of the Collaboratory style be achieved.



Education and Support

A third requirement of a Collaboratory effort is a program for educating users and potential users. As with telephones, electronic mail, and other ways of sharing information, a Collaboratory becomes most beneficial when its use is universal among one's colleagues. An education program must inform people about the collaborative resources and opportunities available and how to make use of them. The program should target both end users who will use the collaborative tools and make use of the data and programs available and those who will add data, applications, and even parts of the infrastructure as the collaboratory grows.



Collaboratory Tools

The four areas of information technology that a Collaboratory must support are:

- data sharing
- software sharing
- remote instrument control
- communication with remote colleagues.

Software tools required for a collaboratory include:

- teleconferencing and telementoring tools, such as MBONE
- information access and retrieval tools, such as Mosaic
- collaborative development and data sharing tools, such as VNS
- televiewing software for remote observation
- networked instrument control software, such as EPICS.

The Molecular Science Research Center (MSRC) and Applied Physics Center at PNL are presently developing an integrated suite of tools as a prototype for a Collaboratory environment.

The Collaboratory concept has the potential to greatly benefit the DOE, and the scientific community in general, by expanding the resources available to individual researchers, increasing the efficiency of our research system, and by coupling basic and applied research efforts more tightly to national goals. It has the potential to remove the walls around departments and organizations, and could lead to the creation of a meta-laboratory with capabilities - in both expertise and equipment - that far exceed those available in any one laboratory.

Resources

A whitepaper that explains the Collaboratory concept and the vision of Pacific Northwest Laboratory in implementing a Collaboratory for the Environmental and Molecular Sciences has been prepared. The whitepaper, workshop proceedings, and information about the Environmental and Molecular Sciences Laboratory at PNL are available in the world wide web (www) pages of the Molecular Science Research Center (URL http://www.msrc.pnl.gov:2080), accessible through www clients such as Mosaic. Interested parties are encouraged to contact us for more information on participating in the development and testing of Collaboratories.

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