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Digital biology: challenges remain

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If computational biology is to be truly integrated into biomedical research practice, the current computer networks that link labs across the United States are inadequate, panelists at a [National Institutes of Health \(NIH\) symposium](#) concluded last week. They urged an infusion of money and technology.

The meeting, organized by the Biomedical Information Science and Technology Initiative (BISTI), an interagency NIH body, brought together leaders in imaging, cellular, and molecular modeling and simulation, genome analysis, proteomics and microarrays. Participants discussed current examples of how computer science has facilitated major biomedical research projects such as applying bioinformatics to complex multigene diseases, the development of computational models of the heart, and the construction of [digital brain atlases](#).

Participants also struggled with how to expand networking capabilities. "The real paradigm shift is that some time over the last decade or so, computing has become so integral in biomedical research that you just can't do modern research [without it]," Eric Jakobsson, director of the [Center for Bioinformatics and Computational Biology](#) at the National Institute of General Medical Sciences, told us. "Now we're at the point where we're realizing that we're really limited by the fact that the computing isn't better." He noted that because software and computing technologies have been born largely of a diverse cottage industry, there's no real coherent plan to put all these pieces together and build an efficient computing environment. The fact that software is hard to use, fragile, and that the different software programs don't interoperate with each other become rate-limiting steps to progress, Jakobsson said.

BISTI's first major project - an attempt to update networking and integration capabilities - will be to award \$3 to \$4 million per year for 5 years to three or four nonprofit 'computational centers of excellence.'

At one session, NIH Director Elias Zerhouni, who recently outlined specific computing initiatives in the [NIH 'roadmap'](#), suggested that 'brute force' computation is not the right approach for biomedical research and that there must be a strong emphasis on mathematical models. One critical component of future computing infrastructure, he said, will be improved access to the proper algorithms and an investment in tools that deliver better data points.

Stephen Katz, director of the [National Institute of Arthritis and Musculoskeletal and Skin Diseases](#), said that computational methodology should be used to construct better predictors of bone fracture based on bone quality and density. Lawrence Tabak, director of the [National Institute of Dental and Craniofacial Research](#), suggested that computational methods might help make saliva - which holds clues to everything from antibody and hormonal levels to signs of illicit drug use - a more convenient diagnostic tool. Noting that more than half of the US population visits the dentist at least once per year, Tabak said he envisioned a massive health surveillance network based on quick oral diagnostics.

In a keynote address, Nathan Myhrvold, former chief technology office at Microsoft and now managing director of a private entrepreneurial firm called Intellectual Ventures, said that Moore's Law - which states that the number of transistors on a microprocessor would double approximately every 18

months - was applicable to a plethora of increasingly cost-efficient, sequenced 'omes,' including the entire 'biome.' [GenBank](#) itself, said Myhrvold, is doubling roughly every 18 months, a 60% growth rate.

But in order to efficiently address the multitude of computational projects - to, as Jakobsson put it, integrate all computational tools so that "they'll all work together like the office tools on your desktop" - better connected labs with better integrated data will be necessary.

At concurrent sessions on 'Networked Science' and 'Scientific Data Integration,' participants expressed some worry about how the NIH will accomplish the mammoth data networking and integration challenges ahead. "The community needs to represent what they see in a rigorous way that's relevant and useable," meeting Cochair Richard Morris, of the [National Institute of Allergy and Infectious Diseases](#), told us. "And when they collect data, the network must be much more reliable than it currently is." The ideas discussed in several sessions will be distributed for E-mail comment and be the subject of future workshops that will culminate in a report.

Nobel Laureate [Sydney Brenner](#), a professor of biology at the Salk Institute, told participants that he envisioned a time when - just as the National Academy of Sciences no longer has a section for molecular biology because every biologist is essentially a molecular biologist - everyone is a computational biologist. But cultural issues must be addressed before such can happen, suggested Myhrvold, who said he is often asked, "Can computer people will be 'real biologists?'" Myhrvold said he usually answers, "You tell me. When are you gonna treat them as real colleagues?"

References

1. Biomedical Information Science and Technology Initiative Symposium 2003, Bethesda, Md., November 6-7, 2003 , [<http://www.bisti.nih.gov/2003meeting/>]
2. Biomedical Informatics Research Network, [<http://www.loni.ucla.edu/BIRN/index.html>]
3. Center for Bioinformatics and Computational Biology, [http://www.nigms.nih.gov/about_nigms/cbcb.html]
4. Russo E: NIH presents new research 'roadmap' *The Scientist*, October 1, 2003., [<http://www.the-scientist.com/news/20031001/04/>]
5. National Institute of Arthritis and Musculoskeletal and Skin Diseases, [<http://www.niams.nih.gov/>]

6. National Institute of Dental and Craniofacial Research, [<http://www.nidcr.nih.gov/>]
7. GenBank, [<http://www.ncbi.nlm.nih.gov/Genbank/GenbankOverview.html>]
8. National Institute of Allergy and Infectious Diseases, [<http://www.niaid.nih.gov/default.htm>]
9. Sydney Brenner, [<http://www.nobel.se/medicine/laureates/2002/>]