Editorial Comments JAMIA

Build for Future Technology When Building for the Future: A Lesson from the Visible Human Project

The long-term goal of the Visible Human Project is to link the print library of functional physiology with the image library of structural anatomy into one unified resource of medical information. Structure and function coming together, seamlessly connected. This has always been a goal in teaching medicine, physiology, or anatomy. Let's visualize how this goal will be accomplished in the future.

Assume that you are interested in tumor growth in the lung. In one computer window, you will run a MEDLINE search on tumor growth in the lung and retrieve the full text of an appropriate article. In the article there is a paragraph that describes a model for lung tumor growth. You will be able to cut the description of the model out of the window with the article and put it on the computer's scratch pad. Then, you will search the Visible Human database for a picture of the lung, which will appear in a second window. When you take the description of the model from the scratch pad and paste it onto a spot on the lung, you will be able to watch the tumor grow! That's the vision. Structure and function, completely interchangeable.

I do not know how to do this today. However, I can see the outline of a path leading to the realization of this dream. In 1987, when the concept for the Visible Human Project was first discussed, we did not know how we would build, store, or distribute the Visible Human data set. But the belief in the future of technology by people who were willing to take the risks allowed us to find the path. In 1994, the male cadaver was sectioned at 1-mm increments because the calculated 15-gigabyte data set was considered to be manageable on only the largest workstations. A year later, in 1995, the female cadaver was sectioned at 0.33-mm increments because the calculated 39 gigabyte data set was considered to be manageable on most workstations. Progress is made by dreamers and those people with technological vision who have the courage to take educated risks.

I believe that it was first said by computer scientist Alan Kaye, but we like to think of it as very appropriate to the Visible Human Project: "The only successful way to predict the future is to invent it." That is one of the lessons of the Visible Human Project. That is the path we need to follow: inventing the future with medical informatics.

I was privileged to give one of the keynote addresses to the 1995 AMIA Annual Symposium on the topic of the National Library of Medicine's (NLM) Visible Human Project. The goals of the address were to describe why the NLM decided to do the Visible Human Project, how the images were collected, and how the images were currently being used.[1] As I was preparing my talk, I realized that there was another important message from the story of the Visible Human Project. It involved the need to step beyond the tools and technology that are available when building a resource for the future.

Retrospectively, factors related both to people and technology were critical to the success of the Visible Human Project from its conception. The people factor involved individuals who shared the vision of what the Project could mean, who were willing to allow the Project to take considered risks, and who had the conviction to underwrite and defend those risks. The technology factor involved a belief in what technology could do as well as a belief in the future advances of technology. If critical decisions had been made on the

basis of what was feasible when the Visible Human Project was first considered, it would never have been started. It took foresight, educated forecasts about the future of technology, and the ability to believe the predictions and plan for them. Advances in technology and people with vision are what made the Visible Human Project possible.

In 1989, when the NLM Long Range Planning Panel on Digital Image Libraries met to consider the Visible Human Project, it estimated the size of the data set from a single cadaver to be about 20 gigabytes. The members of the panel argued that, although building an anatomical digital image library seemed like a reasonable thing to do, it did not seem possible that such an enormous data set could be distributed. They calculated that it would fill almost 20,000 floppy disks and, at a 2400 baud rate, would take almost two years to download. One of the members of that Panel, Dr. Alvy Ray Smith of Pixar, told his colleagues, "On my desk is the machine and the technology that can do what you need. It will be on your desk in five years, because that is how long it will take to penetrate into the consumer market. Do the project so that the data will be ready when the technology arrives." On the basis of Dr. Smith's forecast, the Panel recommended the Visible Human Project—looking into the future and trusting advances in technology.

MICHAEL J. ACKERMAN, PHD

Reference ■

1. Spitzer V, Ackerman MJ, Scherzinger AL, Whitlock D. The Visible Human Male: A technical report. J Am Med Inform Assoc. 1996;3:118–30.

Correspondence and reprints: Michael J. Ackerman, PhD, National Library of Medicine, Building 38A/B1N-30, 8600 Rockville Pike, Bethesda, MD 20894.

Received for publication: 3/7/96; accepted for publication: 3/15/96.

■ **JAMIA.** 1996;3:300–301.

■