

Unexpected Challenges to a Sustainable World

Participants in this session, moderated by Paul MacCready, included Gregory Benford, Leroy Hood, John Hopfield, and science-fiction writer Gentry Lee, currently on leave from his position as chief engineer for the Galileo project at the Jet Propulsion Laboratory.

The central question to emerge from the panel's impressive demonstration of the rapidly dissolving boundary between science fact and science fiction in the late 20th century was this: Do humans have the will and the vision to constructively shape a future that, constructively or not, is bound to reshape them? Not without a fundamental commitment to addressing some extremely sensitive and divisive issues, said Gentry Lee. Asking, "How can we bring the things we've talked about at this panel into the vision of a sustainable world and actually implement them?" Lee went on to say, "I expected some of the earlier panels to cover the need for changed attitudes toward the following subjects: money, knowledge, and even the preferred or desired models of life embodied in such diverse minicultures as religion and entertainment. For the most part, they didn't. Somewhere along the way, we've got to confront the real issue, which is that human values are based upon attitudes toward those subjects. You can't just change these attitudes by changing institutions. You have to come to grips with a reorientation of what's important."

Lee's comments were seconded by panel chairman Paul MacCready, who noted that "social, governmental, political, and religious institutions that were honed by the pressures of the past are often completely inappropriate for the rapid changes that are going on now and which we have every reason to expect will continue into the future."

With regard to sustainability and securing Earth's future, said Lee, a key stumbling block is

the enormous discrepancy between the urgency of the issues that need attention and the number of people actually concerned about addressing them. He called on scientists to make some attempt to bridge the gap. "The problem is that the group at this conference represents the high end of awareness and concern about what happens in the future, and that the great majority of people have such low awareness and interest by comparison. If there is one task that is necessary to overcome the challenges that have been discussed here, it's that all of us who are scientists and technologists must in one way or another become preachers. I mean that literally and figuratively. There are two problems that beset scientists and technologists in the United States today. The first is that most scientists have no idea whatsoever how to communicate, and the second is that most reporters know nothing at all about science. So you put scientists who don't understand how to communicate together with reporters who know nothing about science, and the public returns to *Roseanne* night after night after night. You want to do something about the future, to handle the unexpected, to have a sustainable world? You structure society in such a way that its focus is on education—a lifetime of education. Every human being must know upon his or her first moment of sentience that his or her life is to be dedicated to constantly learning things. We must recognize that the single greatest gift that we can give to those who come after us is not the individual discovery or invention, but rather the understanding of how to spread that discovery or invention through society, so that those of us who are concerned about a sustainable world are joined by a scientifically, technologically literate population who also understand. In the absence of that global education we are kidding ourselves."

Both Gregory Benford and MacCready commented that the talks by Lee Hood and John Hopfield threw into sharp focus the question of how a world already ill-prepared to deal with pressing issues of planetary sustainability and survival would be able to cope with a future marked by the power to redraw the human genetic blueprint on the one hand, and the emergence of a powerful and conceivably competitive artificial intelligence on the other. Said MacCready, "I think it's obvious that the tremendous potential powers in genetics and computers will be controlled, or maybe not controlled, by regular humans with all our frailties. It is frightening to consider this and to try to figure out what can realistically be done to make the transition a positive experience. The only possi-

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bility I can come up with is trying to get genuinely open-minded thinking skills spread around the school system so that literally hundreds of millions of kids are there with all their vitality and inquisitiveness asking penetrating questions, and not being afraid to do so.”

What role besides that of intellectual torch-bearer might scientists be able to play in this process? Instruction by example, said Lee, adding, “I have often been asked, ‘What can nontechnical people, including artists and politicians, learn best from technologists?’ The answer is simple: the value of test. Think how many new, patently absurd systems have been put in place by politicians when any test would have shown that they wouldn’t work.”

In fact, said Benford, the federalist system in the United States offers potentially valuable and largely unexplored opportunities for testing the soundness of various social and political arrangements that might be more conducive to global sustainability. For instance, he suggested, some subset of the 50 states could serve as laboratories for reforming an American educational system “[we all find] deplorable. Why don’t we take three states, one rural, one urban, one intermediate, and try doing something different, such as a voucher system, for five years and see how it works. Why are we so afraid of doing an experiment? Not everything has to be run from the top down. In fact, few things are run well that way. The fact that we’ve got 50 states in this country is supposed to be an asset. It’s turning out to be a liability.”

Not surprisingly, the discussion then turned to some of the “brave new world” issues raised by Lee Hood in his talk on genetic engineering and organisms of the future. While Hood limited his immediate observations to tomatoes (he noted that a team of MIT and Cornell scientists had recently identified and isolated the four genes largely responsible for a tomato’s juiciness, and speculated about the commercial potential this might have for Heinz), those panelists involved not only in science but also in science fiction had no hesitation in venturing farther afield. Said Gentry Lee, “We should acknowledge up front that it is a brief step from using genetic engineering to treat disease to using these techniques to enhance what are considered to be desirable characteristics. It should be an immediate connection that people make that there are some physical and mental and developmental characteristics that are positive contributors to a sustainable world and some that are not. Now, just to trot out a controversial issue, in my view a sustainable world is one in which people have

more appetite for education than I currently see. And I’m not alone in this view. If you find the set of genes associated with intelligence, I guarantee you that somebody’s going to figure out how to use that information in a way to produce a more intelligent member of the species. People do not want to deal with this issue because it’s scary. But I say this to them over and over again, *if we don’t deal with it, the politicians will*. And *that* is scary. If Lee Hood were to say to me, ‘Hey, Gentry, I figured out a way to make all these new people come out much more interested in learning,’ I would say, ‘Don’t tell anybody, Leroy, because that would put the politicians out of a job, and what we want to do is make sure we get it done.’

“If I can add one more thing, imagine that it’s 50 or 100 years from now, five days after conception. The expectant mother goes in for her checkup and is run through what we’ll call ‘Hood’s Data Management System.’ And she’s told the sex and the intellectual aptitude of her unborn child, along with its proclivity toward cancer or hardening of the arteries, and what its eventual height will be, assuming a certain kind of nutrition. This is five days after conception! Then the smiling doctor says, ‘Oh, by the way, you can change anything in column A.’ And then we might have the flavor of the month. This week we have tall, blue-eyed blonds. Next week, something else. We’re serious, folks. We’re serious. This is the kind of thing we’re talking about, and we are not prepared for it as a society.”

Confronted with such unfamiliar challenges, added Benford, humanity may have recourse to familiar remedies in strange new forms. “Imagine,” he said, “the hubbub in this society if, for example, we discovered that only one gene determines your ability to play baseball. These possibilities are fraught with so many issues that I suppose there’s a good chance we may even see the birth of a new religion centered around a new messiah. This faith will have highly original elements in it and, in fact, a kind of strange, magnificent eugenics may be in the soup, in which case, we’re going to get some bizarre creatures. It may come fairly quickly. And when it does, it’s going to be unsettling to a lot of people.” □