

**The Biodesign Institute at Arizona State University**  
**Dedication Address**  
**Phoenix, Arizona**  
**December 14, 2004**

**John Marburger**  
**Director, Office of Science and Technology Policy**  
**Executive Office of the President**

Thank you for inviting me to help dedicate this remarkable new facility. It is one of a handful of institutes being established around the country to take advantage of unprecedented new capabilities in the science and technology of the very small.

Of course we have known for a long time that things are made of atoms, but except for a few simple kinds of physical systems, that knowledge has had limited value. For one thing, our tools for seeing and making things have been too large and clumsy to operate at atomic scale. And things of practical size have enormous numbers of atoms in them. To keep track of where they all are and how they operate, even in the small scale of a human cell, requires the management of a huge amount of data. It was not because we were lazy or unimaginative that visions like the Biodesign Institute did not occur sooner, we just did not have the means to do these things.

For the first time now, we are developing the ability to see, simulate, and manipulate matter on the scale of atoms. Since (nearly) everything is made of atoms – including ourselves and all the material things we need to sustain and ease the burden of our lives – these new capabilities promise to be revolutionary in their impact on society.

How that promise might be fulfilled is a question that governments and planners have been asking for more than a decade. The challenge is one of vision as well as of means. The means seem to be within our reach. Vision may be the more difficult challenge.

At stake here is the entire organization of practical knowledge. We speak of biotechnology, nanotechnology, and information technology as *convergent fields*, partly because we know intellectually that at their smallest scales everything depends on how atoms are arranged in molecules and molecules assembled into larger structures, whether they are inert nanotubes or living bacteria. But now we are asking for more than intellectual recognition of this principal. We are depending on it, and on our new-found capabilities, to help us cope with the rapidly compounding problems of an inexorably growing world. Not only do we need to broaden the categories of knowledge and blur their boundaries to achieve a new level of understanding of these convergent fields, we also need to train a new generation of men and women who can convert the new understanding into entirely new kinds of products.

We have a deep faith that understanding how nature works will somehow help us to survive. But the connection between understanding and finding practical solutions is not so obvious. We know from experience that useful tools for improving the quality of our lives have appeared only after long experimentation punctuated by creative acts of genius. The increasing

pace of challenges, however, – in disease, in the impact of human activity on nature, in the imbalances of human development in growing populations – creates a sense of urgency. We have the sense today that we can no longer wait for the traditional incremental mode of discovery and innovation. We need the new tools and products now to meet urgent challenges.

I believe it is in institutes such as the one being dedicated today that the traditionally slow processes of creativity and innovation can be accelerated, and I congratulate the visionaries who conceived it and are bringing it into existence. I have visited other similar centers around the country. They are all different and they each reflect the particular assets of their region. But none of the other centers I have visited have the energy and excitement that I feel in this one. No other appears to have been so carefully and imaginatively conceived to bring results quickly or to break down the traditional barriers among fields that inhibit useful interdisciplinary innovations.

This is a fine day for Arizona State University and the people of the State of Arizona. Today's ceremony is an excellent beginning for a kind of work that will bring benefits to the entire nation, and indeed the entire world. So now you have the facilities, and you have the people. It's time to get to work and deliver on the promise that brought so much hope and tangible investment to bring the Biodesign Institute to this point. We shouldn't have to wait for years, I look forward to results within months! You have come this far much faster than anyone could have predicted just a few years ago. Don't stop.

Thank you again for making it possible for me to participate in this happy event.