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A Scientific Approach to Policy

THE FINANCIAL MELTDOWN THAT BEGAN IN THE UNITED STATES HAS NOW SPREAD AROUND THE world, providing a rare opportunity for a rethinking of priorities everywhere. We now know that a major portion of the global financial system was built on a myth—that housing prices would rise forever. This false assumption allowed a complex loan-leveraging process to create immense wealth as if by magic. The sudden collapse of this bubble is causing great hardship worldwide. Nevertheless, the new sense of reality could be beneficial, by stimulating much broader recognition of the centrality of science and engineering for successful modern societies.

Science and engineering produce a vibrant economy. Their effects are strikingly obvious in the innovative industrial clusters that have grown up and prospered near great U.S. research universities, in the Boston and San Francisco Bay areas, for example. Nations such as China have long had a clear view of the source of U.S. economic strength, and they have intensely focused on building their own scientific and technological excellence.* But in addition to the innovation that stems from research, scientific habits of mind contribute critically to a nation's success.

The first of these ways of thinking is a sense of optimism: Scientists and engineers share an assumption, based on past experience, that all problems are, in principle, solvable. Thus, they share a belief that increased fundamental knowledge about the natural world will lead to human progress, because they see this happen in their own fields. The astonishingly productive process by which new knowledge is built—combining old knowledge in unpredictable ways—was documented in the 1990s by the U.S. National Academy of Sciences in a series of 20 eight-page pamphlets that remains valuable today, called *Beyond Discovery: The Path from Research to Human Benefit* (www.beyonddiscovery.org). Every society can benefit from the “can-do” attitude of scientists and engineers.

A second valuable attitude is a focus on long-term consequences. The understandings of the natural world derived from science often allow us to predict the future; thus, we can calculate how much bladder cancer will result 30 years hence from drinking water containing trace amounts of arsenic, or the future effects of increased greenhouse gases on Earth's climate. Politicians and businesspeople too often take a short-term view when balancing costs and benefits, with disastrous effects on their societies. Organizations such as national academies of sciences and engineering can provide forceful advice to governments that highlights long-term effects, thereby mitigating this imbalance.

A third valuable characteristic of most scientists and engineers is an emphasis on discovering what works without reference to ideology. The ultimate test of ideas must come from the evidence obtained by probing the natural world, and the feedback from experiments is often surprising. Thus, success requires that we approach every problem with humility, knowing that our favorite hypotheses may be wrong.

My own field of science is cell biology. Cells are enormously complicated systems, with highly interactive molecular machinery that we are still struggling to understand. Political leaders confront equally complex societal interactions, whether they are dealing with the economy, energy policy, health care, or education. Every nation needs nonideological policy-makers who admit that they don't know all the answers; they must experiment with problem solving and expect to learn from the results, just like scientists and engineers do. In recent years, U.S. leaders have taken a very different approach, with quite unfortunate results.

When queried about how he would approach the world's economic crisis, U.S. President-elect Barack Obama responded (on 16 November 2008 on CBS's *60 Minutes*): “. . . I hope my team can . . . experiment in order to get people working again . . . I think if you talk to the average person right now that they would say, ‘. . . we do expect that if something doesn't work that they're going to try something else until they find something that does.’ And, you know, that's the kind of common-sense approach that I want to take when I take office.”

A very promising start to a hopeful new era.

— Bruce Alberts

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*W. Jiabao, *Science* 322, 649 (2008).

