



## More Essays on Nanotechnology Implications

### Introduction

Eleven original essays about the implications of molecular manufacturing—an advanced form of nanotechnology—comprised the previous edition of this journal. Now we have eleven new essays that delve into additional possibilities and impacts of the technology. Some of these offer promising opportunities, while others raise troubling concerns. All twenty-two articles were written by members of a Global Task Force convened by the nonprofit Center for Responsible Nanotechnology (CRN), which we, the editors of these essays, founded in 2002.

The mandate of the CRN Global Task Force is to thoroughly investigate the societal and environmental implications of advanced nanotechnology; to separate real from fictional; and to develop comprehensive, responsible, and workable recommendations. We began this focused effort in August 2005 with a few core people, including Nick Bostrom (Director, Future of Humanity Institute, Oxford University), Jerry Glenn (Director of the AC/UNU Millennium Project), David Brin (author of *The Transparent Society*), Ray Kurzweil (CEO of Kurzweil Technologies), and Robert A. Freitas Jr. (author of *Nanomedicine*).

Since then, our Task Force has grown to more than 65 people on five continents. We are continuing to add others with diverse backgrounds and points of view. Additional experts in geopolitics, economics, ethics, ecology, and international policy formation will be recruited. Without mutual understanding and cooperation on a global level, the hazardous potentials of advanced nanotechnology could spiral out of control and deny any hope of realizing the benefits to society.

Of course, reaching conclusions will not be a quick process. The early work of the CRN Task Force has underscored our realization that there are no simple answers or simple solutions. Our plan from the beginning has been to concentrate first on defining the challenge: What risks do we really face? How do they relate to each other? What is most important to know in order to design wise and effective policies for molecular manufacturing?

The essays you are about to read approach these questions from a variety of different directions.

In our opening piece, Oxford philosopher Nick Bostrom sets the stage with an overview of previous transformative technologies and their ethical challenges in **“Nanoethics and Technological Revolutions: a Précis.”** Following that, Michael Buerger, a Professor of Criminal Justice at Bowling Green State University takes us **“From the Enlightenment to N-Lightenment,”** providing historical perspective and amusing personal commentary.

**“What Price Freedom?”** is an important and disturbing analysis by Robert A. Freitas Jr., a leading nanotechnology researcher, of the dilemmas we may face when confronted by a choice between the danger of freedom and the security of tyranny.

If personal nanofactories supplant a large fraction of traditional manufacturing, distribution, and retailing, then companies and their employees could be impacted by the millions. In **“The (Needed) New Economics of Abundance,”** entrepreneur and computer expert Steve Burgess shows why existing economic structures may be unable to withstand the strain, and why the adoption of new paradigms could be essential. Robert A. Freitas Jr. offers a contrasting view in **“Economic Impact of the Personal Nanofactory,”** his second essay for this collection.

Futurist and business consultant Michael Vassar looks at both commercial and security issues in **“Corporate Cornucopia: Examining the Special Implications of Commercial MNT Development,”** and the Australian social scientist Don Maclurcan tackles the topic of **“Molecular Manufacturing and the Developing World: Looking to Nanotechnology for Answers.”**

In **“Considering Military and Ethical Implications of Nanofactory-Level Nanotechnology,”** computer engineer Brian Wang provides a deeply researched exploration of nanotech impacts on future warfare. Deborah Osborne, a crime analyst and book author, offers her expert views in **“Molecular Manufacturing and the Need for Crime Science.”**

How can we manage the unprecedented power of nanotechnology? Computer scientist Tom Craver describes some approaches that could make a difference in **“Safer Molecular Manufacturing Through Nanoblocks.”** And, finally, author and activist Douglas Mulhall confronts us with some tough ethical (and survival) questions in his essay, **“Are We Guardians, or Are We Apes Designing Humans?”**

Covering topics from commerce to criminology, from ethics to economics, and from our remote past to our distant future, this collection of essays illustrates the profound transformation that nanotechnology will have on all aspects of human society.

Progress toward developing the technical requirements for desktop molecular manufacturing is moving forward rapidly. The ideas you will learn about here are not just interesting speculation, but are very real challenges that we must prepare to meet in the near future.

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Note: The opinions expressed in these essays are those of the individual authors and do not necessarily represent the opinions of the Center for Responsible Nanotechnology, nor of its parent organization, World Care.