

**National Nanotechnology Initiative (NNI)**

**Workshop on  
Societal Implications of Nanoscience and Nanotechnology**  
National Science Foundation  
4201 Wilson Blvd., Arlington, VA 22230  
December 3-5, 2003

**FINAL DRAFT AGENDA**

**Room 375, and breakout (panel session) rooms: 340, 360, 365, 370 and 380**

**DAY 1 (December 3, 2003), Plenary Session, Room 375**

12-1:00 Refreshments  
1:00 **Welcome**, Rita Colwell, NSF Director  
**Charge to the workshop**, M. Roco, NSET, NSF

*We will start with a set of visionary presentations focusing on the future of the field.*

**A. National Endeavor**

Moderator: Mike Roco

**1:15 Nanotechnology: a national endeavor**

John Marburger, Director, Office of Science and Technology Policy

**1:30 Technological and economic goals**

Phil Bond, Undersecretary for Technology, U.S. Dept. of Commerce

**1:55 Science and education vision for nanoscience and nanotechnology**

George Whitesides, Harvard University

2:20 – 2:40 Coffee

**B. Technological and Societal Goals**

Moderator: Rachelle Hollander

**2:40 Industry implications of nanotechnology**

T. Theis, IBM

**3:00 Nanotechnology and society,**

Roger Kasperson, Clark University, Stockholm Environment Institute

**3:20 Social science approaches for assessing nanotechnology**

Lynn Zucker, UCLA

3:40 – 4:00 Coffee

**C. Broader Implications**

Moderator: William Bainbridge

**4:00 Nanotechnology Implications on quality of life: Medicine, environmental, cognition, communication and other areas**

Carlo Montemagno, UCLA

**4:20 Ethical, philosophical issues**

V. Weil, IIT

**4:40 "Navigating Nano through Society"**

D. Baird, University of South Carolina

**5:30 – 6:30 Reception – The Front Page Grille in the NSF Building Atrium**

**6:30 Group Dinner – Hilton Hotel Banquet Room (Hilton connected via skywalk to NSF)**

**“Vision” speaker – Rep. Sherwood Boehlert, House Science Committee Chairman, invited**

**DAY 2 (December 4, 2003)**

*We will next break into five separate (parallel) panels to explore future opportunities and potential breakthroughs in selected sub-fields. For this part of the program, participants are encouraged to come prepared with two pages and two slides (maximum) for a five-minute (maximum) presentation on their ideas for the future of the relevant field.*

**8:00-8:20 Plenary presentation, Room 375**

Moderator: Mike Roco, NSF, NSET

**Technological convergence from the nanoscale (NBIC)**

James Spohrer, IBM

**8:20 – 11:00 Panels, A: Current Issues/Topics in Setting a Research Agenda:**

**1. Impact of nanotechnology on productivity and equity, Room 375**

**Moderators:** M. Roco (NSET, NSF) and Marie Thursby (GIT)

**Contributors:** Evelyn Hu (UCSB), Georg G. A. Böhm (Bridgestone / Firestone Research), George Thompson (Intel), Mark Andrews (Caterpillar), Mark Modzelewski (NBA); John Belk (Boeing), Gregory Tassef (NIST), Jeff Stanton (Syracuse Univ.), Brian Valentine (DOE), William Boulton (Auburn Univ.), Ray Tsui (Motorola), Louis Hornyak (Univ. of Denver), Peter Hébert (Lux Capital), James Canton (Institute for Global Futures), Jim Adams (RPI), Brad DeLong (Berkeley), Jared Bernstein (EPI), Sarah Turner (Univ. of Virginia), Richard Freeman (Harvard), Larry Iannaccone (George Mason Univ.), Robin Hanson (GMU)

**2. Nanotechnology implications on quality of life (medical, environmental, cognition, communication, etc.): nanotechnology goals and unintended consequences, Room 340**

**Moderators:** Carlo Montemagno (UCLA) and Michael Heller (UCSD)

**Contributors:** Steven Papermaster (Powershift Ventures, PCAST representative), David A. Diehl (PPG Industries, Inc.), Rosalyn Berne (UVA), Toby Ten Eyck (Michigan State), Barbara Karn (EPA); Kristen Kulinowski (Rice Univ.), Jeff Schloss (NIH), Hongda Chen (USDA), Donald Marlowe (FDA), Stan Brown (FDA), Sean Murdock (Atomworks), Dick Livingston (DOT/FHWA), Richard Smith (Nanotechnology Policy Forum), Elaine Bernard (Harvard Law), Tanwin Chang (NBER), Nila Bhakuni (Harvard), Stephan Herrera (The Economist), Gunter Oberdoerster (Univ. of Rochester)

**3. Ethical, historical, governance, philosophical implications, risk and uncertainty, Room 370**

**Moderators:** V. Weil (IIT) and Rachele Hollander (NSF)

**Contributors:** M. Kathleen Behrens (RS Investments, PCAST representative), Albert Teich (AAAS), Eleanor Singer (U. of Michigan), Deb Newberry (The NanoTechnology Group, Inc), Carol Lynn Alpert (Boston Museum of Science); Philip Sayre (EPA); Dan Jones (National Endowment for the Humanities), Sheila Jasanoff (Harvard), Robert McGinn (Stanford), Julia Moore (NSF), Jane Macoubrie (NCSU), Frank Laird (Univ. of Denver), Arthur Caplan (Univ. of Pennsylvania), Daniel Goroff (Harvard), Jack Trumbour (Harvard Law), Bruce Lewenstein (Cornell)

**4. Converging technologies and their societal implications , Room 380**

**Moderators:** John Sargent (DOC) and Lynne Zucker (UCLA)

**Contributors:** James R. von Ehr II (Zyvex), Judith Klein-Seetharaman (CMU), Ilesanmi Adesida (UIUC), Sonia E. Miller (Converging Technologies Bar Association), Roger Kasperson (Clark University, Stockholm Environment Institute), David Rejeski (Woodrow Wilson Center), Sharon Levin (Univ. of Missouri), Paula Stephan (Georgia State Univ.), Cyrus Mody (Cornell)

**5. National security, space exploration, Room 390**

**Moderator:** Delores Etter (DOD) and Jim Murday (ONR)

**Contributors:** Kwan Kwok (DARPA), James Batterson (NASA), Judith Reppy (Cornell), John T. Neer (Lockheed Martin), W.M. Tolles (consultant); Jim Murday (ONR, NSET), Scott McNeil (SAIC), Minoo Dastoor (NASA), Martin Carr (DCI), Keith Ward (DHS), Cliff Lau (DOD), George Borjas (Harvard), Ron Oaxaca (Univ. of Arizona), Grant Black (Georgia State Univ.)

**Coffee Break at 9:30 a.m.**

**11:00-12:30 Plenary presentations of summaries 1-5**

**12.30 – 1.30 Working Lunch (lunch brought in the room)**

**1.30 - 4.00 Panels, B:**

**6. Interaction with the public and social networks , Room 375**

**Moderators:** David Baird (USC) and Cate Alexander (NNCO)

**Contributors:** Steven Papermaster (Powershift Ventures, PCAST representative), Albert Teich (AAAS), Eleanor Singer (U. Michigan), Julia Moore (NSF), Toby Ten Eyck (MSU), Jane Macoubrie (NCSU), Carol Lynn Alpert (Boston Museum of Science), Barbara Karn (EPA), Mark Modzelewski (NanoBusiness Alliance), Rosalyn Berne (UVA), Dan Jones (National Endowment for the Humanities), D.M. Berube (Univ. of South Carolina), Bruce Lewenstein (Cornell), David Rejeski (Woodrow Wilson Center), Elaine Bernard (Harvard Law), Jared Bernstein (EPI), Cyrus Mody (Cornell)

**7. Future economic scenarios , Room 340**

**Moderators:** Gregory Tassej (NIST) and Michael Darby (UCLA)

**Contributors:** Mark Andrews (Caterpillar), Robin Hanson (GMU), Ilesanmi Adesida (UIUC); Scott McNeil (SAIC), Georg G. A. Böhm (Bridgestone / Firestone Research), Judith Reppy (Cornell), Brian Valentine (DOE), Hongda Chen (USDA), David Mowery (Univ. of California at Berkeley), Sean Murdock (Atomworks), Linda Parker (NSF), Peter Hébert (Lux Capital), Jim Adams (RPI), Brad DeLong (UC Berkeley), Richard Freeman (NBER), Louis Hornyak (Univ. of Denver)

**8. Future social scenarios, Room 370**

**Moderators:** Bill Bainbridge (NSF) and Roger Kasperson (Clark Univ.)

**Contributors:** Frank Laird (Univ. of Denver), Rosalyn Berne (UVA); Jeff Schloss (NIH), John Belk (Boeing), Jeff Stanton (Syracuse Univ.), John Miller (DOE), James Canton (Institute for Global Futures), Dick Livingston (DOT/FHWA), Arthur Caplan (Univ. of Pennsylvania), Jack Trumbour (Harvard Law), Stephan Herrera (The Economist), Gunter Oberdoerster (Univ. of Rochester), Larry Iannaccone (George Mason Univ.)

**9. Public policy, legal (patents, civic, etc.) and international aspects, Room 380**

**Moderator:** Evelyn Hu (UCSB) and James Rudd (NSF)

**Contributors:** Sonia E. Miller (Converging Technologies Bar Association), Sheila Jasanoff (Harvard), Philip Sayre (EPA), George Thompson (Intel), James R. von Ehr II (Zyvex), V. Weil (IIT), Robert McGinn (Stanford), W.M. Tolles (consultant), William Boulton (Auburn Univ.), E. Jennings Taylor (Faraday Technology, Inc.), Stan Brown (FDA), Ray Tsui (Motorola), Richard Smith (Nanotechnology Policy Forum), Nila Bhakuni (Harvard), Michael Heller (UCSD)

**10. Education and human development, Room 390**

**Moderators:** Michael Gorman (U. VA) and William Frascella (NSF)

**Contributors:** Paul Petersen (RIT), Bruce Seely (MTU), James Batterson (NASA), Deb Newberry (The NanoTechnology Group, Inc), Kristen Kulinowski (Rice Univ.), Paula Stephan (Georgia State Univ.), Sharon Levin (Resource Group), Ron Oaxaca (Univ. of Arizona), George Borjas (Harvard), Tanwin Chang (NBER), Daniel Goroff (Harvard), Sarah Turner (Univ. of Virginia), Judith Klein-Seetharaman (CMU), John T. Neer (Lockheed Martin), John Sargent (DOC)

**4:10 – 5:00 Plenary presentations, Room 375**

Moderator

**4:10. Economical trends and nanotechnology development**

Brad deLong, UC Berkeley

**4:35. Human resources for nanotechnology**

Paula Stephan, Georgia State Univ.

**5:00- 6:30 Plenary presentations of summaries 6-10, Room 375**

**7:00 Group dinner – The Front Page Restaurant & Grille in NSF Building Atrium**

**DAY 3 (December 5, 2003)**

**8.00 - 9.15 Plenary discussion, Room 375**

Definition of research and education challenges

Recommendations for future R&D, infrastructure and education needs, societal preparation, etc. Plan for report preparation and agenda for the remainder of the day (M. Roco)

9:15 coffee break, disburse to breakout rooms

**9:30 - 11:00** Dec. 4 panels meet individually to refine summaries presented at end of previous days' discussions and agree on report drafting assignments for report chapters that will arise from each panel session.

**11:00 - 12:00** Plenary session: each of the ten panels present refined summary and outline/report writing assignments to the full group back in Rm. 375 (~5 minutes for each group). Plenary discussion to provide feedback, mid-course correction to these proposed outlines and assignments.

**12:00 - 2:00 Optional Luncheon Session: Institutional Implications of Government Science Initiatives (15 minute prepared talks plus five minutes for questions/discussion after each talk), Room 375**

Moderator:

12:00 box lunches available in Rm. 375 if you wish to participate in this session

**12:20 Historical Comparisons for Anticipating Public Reactions to Nanotechnology**

Christopher Toumey, Univ. of South Carolina

**12:40 Past Experiences**

Alex Roland, Duke Univ.

**1:00 Present Adjustments**

Toby Smith, AAU

**1:20 Future Perspectives: The Role of National Research Initiatives**

Tom Kalil, UC Berkeley

**1:40 Congressional Perspective: Societal Implications Issues in the Nanotechnology Act**

David Goldston, Chief of Staff, House Science Committee

**2:00 Re-group to breakout rooms for resumption of drafting sessions**

**3:45 Plenary session; concluding remarks (M. Roco, C. Teague)**

**4:00 Adjourn**

Suggested Tables for the Report:

**Table 1. R&D challenging areas and key priorities**

<b>R&amp;D challenging areas</b>	<b>Key priorities/Goals</b>	<b>Recommended modes of support &amp; Agency</b>	<b>Transition term (Timeline)*</b>

(\* ) The R&D areas of opportunities for transition of fundamental research to commercial products may be separated into short term (1-5 years), mid-term (5- 10 years) and long-term (10-20 years) categories.

