## Questions for Stakeholders

If you would like to submit individual input outside of the breakout sessions, please visit http://nano.gov/node/1024.

## Technical Challenges

- What are the most important scientific and technical challenges that would need to be met to realize the NNI goals?

    **Background**: The February 2011 NNI Strategic Plan (http://www.nano.gov/sites/default/files/pub_resource/2011_strategic_plan.pdf) specifies four overarching, crosscutting goals towards achieving the overall vision of the NNI:

    - **Goal 1: Advance a world-class nanotechnology research and development program.**
      The NNI ensures U.S. leadership in nanotechnology research and development by stimulating discovery and innovation. This program expands the boundaries of knowledge and develops technologies through a comprehensive program of research and development. The NNI agencies invest at the frontiers and intersections of many disciplines, including biology, chemistry, engineering, materials science, and physics. The interest in nanotechnology arises from its potential to significantly impact numerous fields, including aerospace, agriculture, energy, the environment, healthcare, information technology, homeland security, national defense, and transportation systems.
    - **Goal 2: Foster the transfer of new technologies into products for commercial and public benefit.**
      Nanotechnology contributes to U.S. competitiveness and national security by improving existing products and processes and by creating new ones. The NNI implements strategies that maximize the economic benefits of its investments in nanotechnology, based on understanding the fundamental science and responsibly translating this knowledge into practical applications.
    - **Goal 3: Develop and sustain educational resources, a skilled workforce, and the supporting infrastructure and tools to advance nanotechnology.**
      A skilled science and engineering workforce, leading-edge instrumentation, and state-of-the-art facilities are essential to advancing nanotechnology research and development. Educational programs and resources are required to produce the next generation of nanotechnologists—that is, the researchers, inventors, engineers, and technicians who drive discovery, innovation, industry, and manufacturing.

- **Goal 4: Support responsible development of nanotechnology.**
  The NNI aims to maximize the benefits of nanotechnology and at the same time to develop an understanding of potential risks and to develop the means to manage them. Specifically, the NNI pursues a program of research, education, collaboration, and communication focused on environmental, health, safety, and broader societal dimensions of nanotechnology development. Responsible development requires engagement with universities, industry, government agencies (local, state, and Federal), nongovernmental organizations, and other communities.

- What are the most important ongoing NNI activities to continue?

  **Background**: The most up-to-date information on NNI activities is available at http://nano.gov/.

- What are the most important gaps in NNI agency-funded R&D (*i.e.,* specific underfunded areas ripe for success) that should be addressed to achieve the NNI goals?

  **Background**: More information about the R&D portfolio is available in the NNI Supplement to the President's 2014 Budget (http://www.nano.gov/sites/default/files/pub_resource/nni_fy14_budget_supplement.pdf) and on the Nano Dashboard (an interactive website that reports NNI investments since FY2006, http://nanodashboard.nano.gov/).

- What factors should be taken into consideration in emphasizing topical areas as Nanotechnology Signature Initiatives?

  **Background**: To accelerate nanotechnology development in support of the President's priorities and innovation strategy, NNI member agencies have identified areas ripe for significant advances through closer program-level interagency collaboration oriented around specific targets. The five current Nanotechnology Signature Initiatives (details are available at http://www.nano.gov/signatureinitiatives) are:

  - Nanotechnology for Solar Energy Collection and Conversion;
  - Sustainable Nanomanufacturing;
  - Nanoelectronics for 2020 and Beyond;
  - Nanotechnology Knowledge Infrastructure; and
  - Nanotechnology for Sensors and Sensors for Nanotechnology.

  These Nanotechnology Signature Initiatives represent the leading edge of functional interagency collaboration in the budget and program planning process under the NNI, with multiple agencies working in common toward specific objectives.

- What are appropriate technical topics, approaches, and mechanisms to leverage and/or coordinate US-funded research and development with international efforts?

## Commercializing Nanotechnology

- What best practices can be drawn from policies and programs designed to promote technology commercialization in other sectors and countries? Are there any case studies that can support this?

- How can NNI member agencies, individually and collectively, diminish real and perceived barriers to commercialization and technology transfer and ease the pathway to translate research results into practical applications and products?

- What can the NNI member agencies do to foster an environment that enables and supports commercialization and technology transfer, including entrepreneurial efforts?

- How can nanotechnology standards be more effectively formulated and employed to facilitate commercialization, and what additional standards are needed?

    **Background**:  See the standards page on nano.gov, http://www.nano.gov/you/standards.

- How can open innovation (networking, leveraging, partnering, and sharing resources and knowledge) be utilized by NNI member agencies to facilitate commercialization of technologies emerging from the NNI portfolio?

- What international activities should NNI member agencies consider to facilitate commercialization of nanotechnology?

## Environmental, Health, and Safety Considerations

- Are there impediments (technical or otherwise) to environmental, health, and safety (EHS) research that are unique to nanotechnology?

- What are the most important gaps in the EHS R&D portfolio of NNI member agencies (*i.e.*, specific underfunded areas ripe for success) that should be addressed?

    **Background**: More information about the EHS R&D portfolio is available in the NNI Supplement to the President's 2014 Budget (http://www.nano.gov/sites/default/files/pub_resource/nni_fy14_budget_supplement.pdf) and on the Nano Dashboard (an interactive website that reports NNI spending since FY2006, http://nanodashboard.nano.gov/).

- How can results of EHS research, including research on potential risks to humans and the environment, be more clearly communicated by the NNI to stakeholders?

    **Background**: See the EHS page on nano.gov (http://www.nano.gov/you/environmental-health-safety) for some existing communication mechanisms, including links to the NNI EHS Research Strategy and various agency nanotechnology websites.

- How can NNI member agencies more effectively partner with international organizations and/or non-governmental organizations for EHS research and other activities?

**Background**: Examples of current and previous international engagement activities are available at http://nano.gov/initiatives/international and http://us-eu.org/.

- Are there additional activities that could better promote the development of standards, tools, and methods for EHS research?

    **Background:** See the 2011 NNI EHS Research Strategy, in particular the section on Nanomaterial Measurement Infrastructure, pp. 11-22, http://www.nano.gov/node/681.

## Infrastructure Needs

- What more can NNI member agencies do to build/sustain cohesive and substantial centers and/or facilities and networks of broad relevance to the nanotechnology community?

    **Background**: See current NNI Centers and Networks at http://nano.gov/centers-networks.

- What additional equipment and/or technical capabilities could user facilities add to meet users' needs?

    **Background**: See a list of current NNI User Facilities at http://nano.gov/userfacilities.

- How can NNI member agencies better facilitate the training and education of an appropriate scientific and technical workforce?

    **Background**:  See http://www.nano.gov/education-training for information on existing activities.

- How can NNI member agency facilities better publicize their capabilities to the broader science and technology community and facilitate user access?

## Ethical, Legal, and Societal Implications

- How can the NNI promote a better general understanding of nanotechnology in public education and within the public at large?

- How can NNI member agencies foster collaboration among the relevant communities to promote an informed understanding of benefits and potential risks of nanotechnology?

- How else can NNI member agencies promote informed decision-making regarding nanotechnology in the general public?

    **Background:** See the nano.gov page on ethical, legal, and societal issues, http://www.nano.gov/you/ethical-legal-issues.

- In what ways can the Federal government best engage with citizens to facilitate the sustainable development of nanotechnology-based products with the broadest economic and societal benefits?

- What types of additional information would you like to see available on NNI activities that is not currently or readily accessible (*e.g.,* via nano.gov)?