

OMB Control No. 0693-0033
National Institute of Standards and Technology (NIST)
Generic Clearance for Program Evaluation Data Collections

Economic Impacts of Nanotechnology Documentary Standards

1. Explain who will be surveyed and why the group is appropriate to survey.

The Standards Coordination Office (SCO) of the National Institute of Standards and Technology (NIST) will be conducting a survey of documentary standards *developers* and *users* to ascertain the economic impacts of nanotechnology documentary standards developed between 2005 and 2012.

Three standards development organizations (SDOs) have been developing “proactive” documentary standards in the emerging field of nanotechnology: ASTM International’s Technical Committee on Nanotechnology (ASTM E56); the International Electrotechnical Commission’s (IEC’s) Technical Committee (IEC/TC113), Nanotechnology Standardization for Electrical and Electronics Products and Systems; and the International Standards Organization’s (ISO’s) Technical Committee (ISO/TC229), Nanotechnology. Based on communications with the U.S. Technical Advisory Groups (TAGs) of these SDOs, approximately 150 private sector, public sector, and university organizations are involved in the development of nanotechnology documentary standards. These organizations comprise one survey population subset.

In addition to the members of the U.S. TAGs for these SDOs, it is hypothesized that many more organizations utilize the published nanotechnology standards to reduce gaps in understanding and increase the efficiency of a wide range of production, testing, and research operations. More than 40 nanomaterials are used in commercial products and in research and development projects. Their applications span a wide range of products, including foods, beverages, personal care and cosmetics, pharmaceuticals, medical devices, paints and coatings, structural materials, automobile tires, energy, lightweight materials, clothing, sporting goods, and communications. To represent this facet of the population, approximately 100 organizations comprising the membership of the broad-based NanoBusiness Commercialization Association (NanoBCA) will be surveyed.

Finally, a network of university research organizations has been funded as part of the U.S. National Nanotechnology Initiative (NNI). The National Nanotechnology Infrastructure Network (NNIN) consists of 14 advanced nanotechnology user facilities, located at [14 major universities](#) across the country. The site directors of these user facilities will comprise the third survey population subset.

This economic impact assessment has two primary goals and one secondary goal. The first primary goal is to generate and document an understanding of the role of “proactive standards” in an emerging technology field and to estimate of the economic effects of those standards in

terms of efficiencies resulting from their development and availability. The second primary goal of the survey is to assess the benefits of involvement in the standards development process by comparing the economic benefits enjoyed by SDO participants versus organizations that use standards but do not participate in their development. The secondary goal of the survey is to assess the economic significance of NIST's participation in the standards development process.

2. Explain how the survey was developed including consultation with interested parties, pretesting, and responses to suggestions for improvement.

The survey was developed by an experienced contractor (TASC, Inc.), in consultation with the SCO project lead, Erik Puskar, and an expert consultant, Dr. John Scott, of Dartmouth College. Dr. Scott and the TASC project leader, David Leech, have conducted numerous similar studies for NIST.

In preparation for the design of the survey strategy, an extensive literature survey was undertaken and background interviews were conducted with nine industry representatives involved in the standards development process. Knowledgeable NIST technical staff members were also consulted. On the basis of this background information, categories of activities are identified that are hypothesized to have benefited from operational efficiencies enabled by the development and use of the documentary standards published in the 2005-2012 time frame.

The survey instrument was developed in consultation with individuals possessing knowledge and experience comparable to that of the intended survey respondents and with selected industry representatives. Their suggested changes in content and phrasing are included in the survey instrument.

3. Explain how the survey will be conducted, how customers will be sampled if fewer than all customers will be surveyed, expected response rate, and actions your agency plans to take to improve the response rate.

The survey will be conducted by email with email or phone follow-up as necessary. The contractor will send an initial email message directly to the prospective respondents (if that can be arranged), or by proxy through the U.S. TAG liaison office or NanoBCA's Executive Director. The email will be sent on the NIST sponsor's behalf, explaining the purpose of the survey, and asking for the respondent's participation. Respondents will be asked to respond directly to the TASC assessment project leader. Experience shows that brief follow-up communications are required to clarify responses and fill in data gaps. Often, too, "reminders" are required. Experience indicates that a short survey response time is effective. SCO will ask for a 2-week response time with periodic "reminders" during the second week.

We anticipate 80 percent response rate from the three U.S. TAGs, a 70 percent response rate from NanoBCA members and a 80 percent response rate from National Nanotechnology Infrastructure Network's 14 advanced nanotechnology user facilities site directors.

SCO project good response rates because of the institutional support the project has cultivated during its initial stages. NIST's nanotechnology impact assessment project has been introduced to the survey population subsets in advance of the actual survey process. The project leaders — Erik Puskar and David Leech — were introduced to the nanotechnology standards community at a recent meeting of the Nanotechnology Standards Panel, organized by the American National Standards Institute (ANSI). This was followed by extensive communications with most U.S. TAG Working Group leaders and members.

At the request of the Executive Director of NanoBCA, the impact assessment project was briefed to the association's membership. At their main annual event in March of 2013, members of the NanoBCA community were also encouraged to participate in a forthcoming survey. It is anticipated that NanoBCA's leadership and the U.S. TAG leaders for ASTM E56, IEC/TC113, and ISO/TC229 will encourage their members to participate in the survey.

Finally, NIST's Center for Nanoscale Science and Technology (CNST) has been very supportive of the nanotechnology standards assessment effort, though representatives question if the very basic research conducted at NNIN facilities do, indeed, benefit from documentary standards. There are some reasons to believe that they may and we anticipate that CNST will encourage its sister user facility organizations to participate, if only to indicate that no such benefits accrue and to suggest reasons why that is so.

Responses to the survey will be returned via email to the TASC analyst who initiates the survey process. Once responses are received, responses will be collected in a spreadsheet for further analysis and aggregation. Data specific to individual companies will only be available to TASC analysts assigned to the project and the NIST project lead. These data will not be reported or shared with others in their raw form but only as aggregates that hide individual and organizational identities.

4. Describe how the results of the survey will be analyzed and used to generalize the results to the entire customer population.

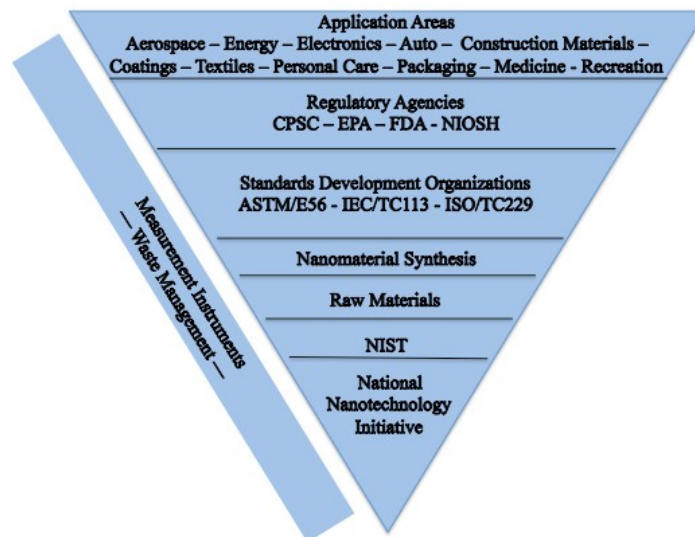
The survey data collected will be used in a report containing estimates of the return on investment (ROI) to industry and NIST resource expenditures directly in support of the SDOs. Return on investment to industry will be assessed in terms of industry benefits (in the form efficiencies associated with a wide range of activities anticipated to be affected by the development and use of consensus standards). These benefits will be assessed counterfactually. That is, respondents will be asked to estimate the cost of performing today's post-consensus standards activities, as if the consensus represented by the standards did not exist. These estimated benefits will be assessed relative to the estimated costs of the time invested by industry

and NIST in the development of the consensus documentary standards. In addition to quantitative estimates used to calculate a time series of net benefits over the study period, survey data will also be used to describe the qualitative benefits of participation in the standards development process.

The final impact assessment report will be freely available to the public and posted on NIST’s website, in accordance with common practice.¹

In previous assessments for NIST the contractor has been able to quantify uncertainty in the responses using a number of approaches. The simplest approach is to provide ranges of estimates across the types of respondents and incorporate within those estimates the range of uncertainty about the specific parameters the survey intends to estimate.

Regarding the scaling of net benefits data to the entire population of beneficiaries, the nanotechnology value chain is depicted in the figure below. Since there are no reliable external sources of information about the participation of companies in the affected industry tiers, or of the distribution of market share within a tier, survey respondents are asked to identify the nanotechnology value chain tier to which they belong and to conservatively estimate the size their tier. This information will be used to scale net benefits to the entire population.



The Nanotechnology Value Chain

1. See, http://www.nist.gov/director/planning/impact_assessment.htm