Global Dialogue on Nanotechnology and the Poor (GDNP)
Opportunities and Risks

Meeting Summary

Steering Group Meeting
22-23 June 2005
London, England

EXECUTIVE SUMMARY

Meridian Institute convened the Global Dialogue on Nanotechnology and the Poor: Opportunities and Risks (GDNP) to raise awareness about the implications of nanotechnology for developing countries, develop an action plan that addresses opportunities and risks, and identify ways that science and technology can play an appropriate role in the development process. During the first phase of the GDNP, which began in May 2004, Meridian used several strategies for accomplishing these objectives including: publishing a paper to raise awareness about the implications of nanotechnology for developing countries; organizing an online consultation for people to share their own views and questions; conducting one-on-one consultations with numerous individuals; participation in meetings and conferences; and, convening multi-stakeholder dialogue process(es) to exchange information and develop shared strategies. To help define the focus of the GDNP's second phase, Meridian convened a Steering Group (SG) on 22-23 June 2005 in London.

The SG suggested that the GDNP can play a critical part in addressing the potential opportunities and risks that nanotechnology presents for people in developing countries. The SG provided important advice on the context in which the GDNP will be operating, as well as a number of issues the GDNP should take into account (e.g., issues related to information and mapping, awareness raising, networks and partners, and capacity building).

Most participants suggested that the focus of the GDNP's second phase should be on near-term opportunities and risks. Many participants supported a focus on project-level activities, which would examine both opportunities and risks of nanotechnology products that may address challenging human development issues. Most participants also agreed that high-level, global discussions will be important, whether on specific issues or as a high-level contact group to ensure that experiences world-wide are shared and used to improve future efforts.

Based on the SG discussions, Meridian Institute has identified several activities as the focus for the GDNP's second phase. Taken as a package, this collection of activities is designed to address the critical issues identified by the SG and the overall objectives of the GDNP.

- Identifying Specific Opportunities and Risks

  Meridian will commission papers on nanotechnology applications being developed or already commercially available in the fields of water and commodities, to take a broad look at the opportunities and risks associated with the potential use of specific technologies in developing countries. Building on the commissioned papers, Meridian, in partnership with other organizations, intends to convene and facilitate pre-project workshops focused on nanotechnology applications relevant to specific substantive issues areas (e.g., water, commodities). These workshops will explore the potential application of specific nanotechnologies to specific development challenges and provide an opportunity to begin designing projects that would examine, in-depth, both the potential opportunities and risks of these products.

- Ground-Truthing Opportunities and Risks

  If the commissioned papers and multi-stakeholder pre-project planning workshops lead to specific on-the-ground projects, the GDNP may continue to convene multi-stakeholder processes to monitor and learn from the benefits and risks emerging from the projects and bring those lessons into relevant global discussions.

- Generating Information, Raising Awareness, Fostering Linkages and Informing Decisions

  The GDNP will generate information and raise awareness to help society engage in informed dialogue about the implications – opportunities and risks – of nanotechnology for developing countries. Specific activities to be pursued include:

  - Developing a "Nanotechnology and Development News Service";
  - Organizing "add-on sessions" at planned meetings;
  - Fostering a network of networks to promote linkages, synergies, and coordination;
  - Organizing a South-South nanotechnology meeting of leaders of national nanotechnology programs in developing countries;
  - Convening advisory and informational meetings to inform decision making by bi-laterals, foundations, governments, etc.

- Addressing Issues of Global Significance

Meridian intends to convene multi-stakeholder meetings on issues of global significance. These meetings will be designed to address cross-cutting issues that emerge from project-level activities (i.e., similar issues emerging from one or more projects) as well as other issues that have been identified by a cross-section of stakeholders. Meridian proposes, initially, convening two global meetings; one meeting focused on regulatory initiatives related to nano-particles and nano products and a second meeting on intellectual property rights, technology transfer, and access to technology.

INTRODUCTION

Nanotechnology involves the study and manipulation of matter on a very small scale, generally in the range of 1-100 nanometers and encompasses a broad range of tools, techniques, and applications. It is widely perceived as one of the most significant technologies of the 21st century. Many people see nanotechnology as the next "transformative technology," like the Internet or electricity. Just as electricity changed society in ways that society could not imagine in the early days of that technology, so too will nanotechnology, they argue.

Both the public and private sectors are investing heavily in nanotechnology. Over 20 countries, including many of the more advanced developing countries such as China, South Africa, Brazil, and India, have national nanotechnology programs resulting in a collective public sector investment of approximately $4 billion in 2004. Estimated private sector investments in 2004 added at least an additional $4 billion. In addition to growing investments in research and development (2005 investments are expected to exceed $9 billion), the number of patents on nanotechnology-related inventions and scientific literature citations continues to skyrocket. Nano-science is clearly advancing at a rapid pace.

Some people believe nanotechnology could play a key role in assisting humanity in meeting its present needs, while helping assure that the needs of larger, future generations can also be met. Several recent reports, perhaps most prominently the report of the UN Millennium Project Task Force on Science, Technology, and Innovation, conclude that science and technology in general, and nanotechnology in particular, can make an important contribution to alleviating poverty and

achieving the Millennium Development Goals (MDGs).[1] Other people are concerned about the potential effects on human health and the environment, as well as the socio-economic implications of nanotechnology.

Despite these levels of expenditure and the increased interest in nanotechnology shown by regulatory agencies, companies, non-governmental organizations (NGOs), and other stakeholders, we are in the early stage of this phenomenon. There is still time and space for stakeholders to examine the issues and chart a collective path forward to ensure human development needs are considered as the technology evolves.

Given both the potential and concerns, Meridian Institute (http://www.merid.org)[2], with initial funding from The Rockefeller Foundation and International Development Research Centre (IDRC), launched the Global Dialogue on Nanotechnology and the Poor: Opportunities and Risks (GDNP) in May 2004 in order to:

1. Raise awareness about the implications of nanotechnology for the poor;
2. Close the gaps within and between sectors of society to develop an action plan that addresses opportunities and risks;
3. Identify ways that science and technology can play an appropriate role in the development process.

During the initial phase of the project, Meridian focused extensively on the first GDNP objective.[3] Meridian addressed this objective in part by releasing a paper on 24 January 2005, "Nanotechnology and the Poor: Opportunities and Risks – Closing the Gaps Within and Between Sectors of Society." The paper was intended to raise awareness about the implications of nanotechnology for people in developing countries. It was intended to raise general public awareness about the issues but, more specifically, it was written to help bridge the gap between people who have been traditionally focused on science and technology issues and people who have been historically focused on development issues. The paper has been downloaded by hundreds of people, widely reported in the media, and is listed in important reference documents on several websites including SciDev.Net.

The paper, along with several other publications and conferences, helped contribute to a growing awareness about the issue, which is reflected by an increasing number of publications and conferences that are focused entirely or in part on the opportunities and risks of nanotechnology for the South. In conjunction with the release of the paper, Meridian initiated an online consultation for anyone to provide feedback about the issues discussed in the paper as well as other issues that the paper may have overlooked. We received approximately 600 individual comments, which helped informed the design and focus of the steering group meeting described below. The paper and the results of the online consultation are publicly available at: http://www.nanoandthepoor.org/paper.php.

To help define the focus of GDNP's second phase, which began in September 2005, Meridian convened a Steering Group (SG) on 22-23 June 2005 in London. Twenty people living and working in both developed and developing countries from companies, nongovernmental organizations, academic institutions, governments, and donors participated in the meeting (please see Attachment 1 of this summary for a complete list of participants and Attachment 2 for

[1] UN Millennium Project. 2005. "Innovation: Applying Knowledge in Development." Task Force on Science, Technology, and Innovation.

[2] Meridian Institute Meridian Institute is a non-profit organization whose mission is to help people solve problems and make informed decisions about society's most contentious and complex issues. Meridian's mission is accomplished through facilitation, mediation, and consultation services. Meridian works at the local, national and international levels. Our work focuses on a wide range of issues related to environment and sustainability, science and technology, and health care.

[3] The first phase of the GDNP began in mid-2004 and continued through mid-2005. The second phase of the project will commence in the fall of 2005 and is proposed to continue through mid-2008. Subsequent phases will depend on stakeholder interest and funding.

the agenda). SG members were selected because of the stakeholder groups they represent and their diverse viewpoints and expertise, which Meridian believes must be carefully considered in designing an on-going process that effectively addresses the technically and politically complex subjects emerging at the intersection of nanotechnology and development. During the SG meeting, Meridian sought input on the strategic direction for the GDNP, especially the precise focus of the multi-stakeholder dialogue process(es) that will be the primary focus during the second phase of the GDNP. In the summary below, Meridian describes the outcome of the Steering Group meeting as well as the next steps Meridian intends to pursue.

SG members participated in their personal capacity, where appropriate, not as formal representatives of their organizations. This summary report does not attribute comments to specific individuals.

STEERING GROUP MEETING – MERIDIAN INTRODUCTION

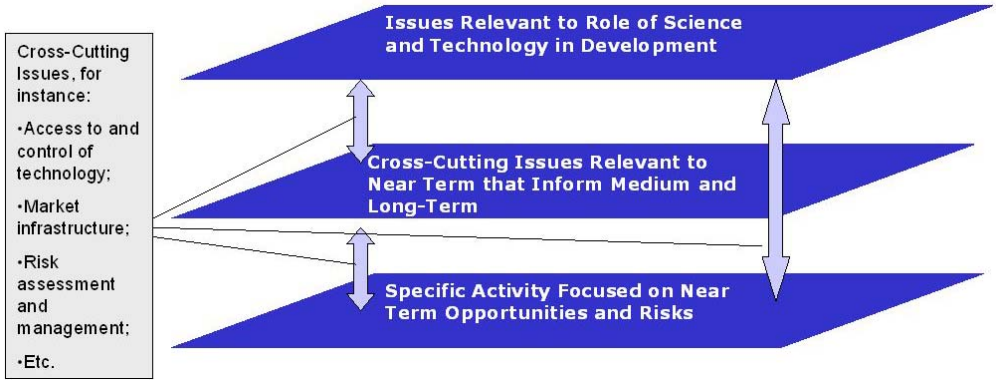
In an introductory presentation, Meridian described the history, purpose, goals, intended outcomes, and proposed timeline of the GDNP. Meridian began by reviewing the primary activities during the first phase of the GDNP (described above), which lasted from mid-2004 through mid-2005. Meridian also reported on the input received in late 2004 and early 2005 from a broad range of people about the issues that would be useful to explore through multi-stakeholder dialogue processes, which will be a primary but not exclusive focus of the GDNP during its second phase. These multi-stakeholder processes are intended to provide on-going mechanisms for awareness raising but, more importantly, will be designed to help individuals and institutions with diverse interest to share information and, when and where appropriate, develop shared strategies for addressing both the opportunities and risks nanotechnology presents for developing countries (see Attachment 3 for a copy of PowerPoint slides used for this section of Meridian's introduction).

As a starting point for the discussions, Meridian suggested that interrelated multi-stakeholder dialogue processes could take place to identify and address issues at three levels:

1) Project- and needs-driven activities focused on specific technologies and their implications;
2) Activities that address cross-cutting issues that are relevant to a range of projects, as well as near-, medium- and longer term implications of nanotechnology, and that may be addressed most effectively at a broader level (e.g., national, regional, international); and
3) Activities aimed at illuminating the role of science and technology in development through the GDNP's focus on nanotechnology.

Meridian envisioned that activities at each level would inform activities at the other levels resulting in an overall package of processes that address the most critical issues – both at a policy and practical level – that nanotechnology presents for developing countries as well as broader issues at the intersection of science, technology and development. A depiction of this discussion framework is provided in the following figure.

Figure 1: Discussion Framework on Interrelated Levels of Activities



STEERING GROUP DISCUSSIONS

The focus and structure of the GDNP were the core topics of discussion. In general terms, most participants agreed that the initial focus of the multi-stakeholder component of the GDNP should be on near-term opportunities and risks. Some participants suggested that, while it was appropriate to focus on near-term opportunities and risks, it would be prudent for the global community to begin discussing issues associated with more advanced forms of nanotechnology and their implications for the poor, because discussions about policies, regulations, and standards often take years. Many participants supported a focus on project-level activities, which examine both the opportunities and risks that nanotechnology products may present for addressing challenging human development issues. Most participants also agreed that high-level, global discussions will be important.

While participants supported pursuing both project and global level activities, some participants advocated for a primary or exclusive focus at the project level, while other participants advocated for a primary focus at a global level on broad issues such as access and control. Some participants preferred that a single global dialogue group address multiple issues at a global level, while other people preferred that global issues be addressed as needed, in an ad hoc fashion (i.e., a single global dialogue group that addresses multiple issues may not be needed). Several participants noted that project-level activities may identify questions that are appropriate and tractable for global-level discussions.

Participants agreed that nanotechnology should not be seen as a panacea for all problems, but that it might offer options to develop unique solutions that would otherwise be unavailable to address specific problems. Participants noted that many development problems depend on a range of complex societal factors, and cannot be solved through technology alone.

Project-Level Activities

Participants agreed that project-level activities would provide good opportunities to address both opportunities and risks, including nanotechnology's potential contribution to the Millennium Development Goals (MDGs). Participants spoke about the use of nanotechnologies to clean water. In particular, participants noted the potential contribution of nanotechnology to removing arsenic and fluoride contamination from drinking water – a problem that is particularly prevalent in parts of Asia. They also mentioned the possibility that nanotechnology presents for providing clean water to large rural and peri-urban populations that typically do not have access to clean or treated water (most water treatment facilities are centralized in cities).

One currently available, non-nanotechnology application – reverse osmosis (RO) – can address the issues above (e.g., arsenic contamination and clean water supply in remote areas), but is very expensive. Some participants suggested that a project (or set of projects) look at available nanotechnologies to assess whether they will provide affordable, safe and reliable solutions to bring clean water to poor people. Specifically, some participants are interested in assessing whether nanotechnology applications can provide solutions for clean water that are more economical than RO.

The International Water Management Institute (IWMI),[4] the NanoWater[5] initiative, The Academy of Sciences for the Developing World (TWAS), and various water-focused networks and organizations could be partners in developing such projects. Some participants were optimistic that this set of activities could be carried out in a one-year timeframe.

A project might include the following elements:

- Identify specific problems related to helping poor people access clean water;
- Identify nanotechnology applications for clean water that are currently available;
- Assess which specific nanotechnologies might provide clean water;
- Conduct laboratory trials to assess effectiveness of the technology(ies);
- Analyze possible risks and identify any unforeseen consequences;
- Compare opportunities and risks of available nanotechnology and non-nanotechnology products; and
- Conduct field trials, if appropriate.

In some cases, projects might lead to the actual commercialization and distribution of products. In other cases, projects may stop before this step, but serve a useful purpose in highlighting risks, socio-economic impacts, research and development opportunities, issues related to intellectual property rights and access, etc.

Several participants suggested that applications in health, energy, agriculture and food might also be candidates for projects because they are close enough to commercialization. Each project, given the different substantive focus and technology characteristics, would require the involvement of different sets of stakeholders. Some participants noted that public-private partnerships, which involve private foundations, communities, and others, can generate the financial and political will to start nanotechnology projects in developing countries.

A participant noted that pursuing projects will help inform the broader societal dialogue and that it might be prudent to include one or two that are likely to have positive implications from nanotechnology as well as one or two that might present challenges or problems, hence, further informing the global discussion in a more robust way. One specific suggestion would be a project focused on nanotechnology applications that could reduce or eliminate the need for raw materials grown in developing countries (e.g., textiles or rubber). While these types of applications may have long-term positive benefits, the short-term socio-economic impacts could be significant. A project on textiles or rubber, for example, could be focused on developing mechanisms for anticipating socio-economic impacts of a specific nanotechnology product or class of products well before the product adversely affected a country's economy.

Some participants suggested starting with one project as a pilot while other people suggested starting several projects simultaneously.

[4] http://www.iwmi.cgiar.org/
[5] http://www.nanowater.org/

Other comments related to project-level activities included the following.

- The appropriate organizations and individuals need to be involved at a project level including but not limited to people from the country where a project is implemented (see also comments in the section “Capacity Building”) and companies that own nanotechnologies.

- Projects should address questions about who bears the risk of bringing a new technology to a new market. Companies may be reluctant to move products into areas if they (fully) bear the risks associated with the undertaking. Examples created by a pilot project could give industry ideas about how they could reach the poor.

- Intellectual property (IP) issues may arise at the project level; these issues could be addressed at both a project-level and at a global level in a cross-cutting fashion (see also examples in the section “Global Activities”).

- Objective-driven (e.g., removing arsenic and fluoride from drinking water), rather than technology-driven, projects and initiatives may prove effective and attractive to partners.

- Project-level activities can be one tool for influencing how research and development dollars are spent.

- Project-level activities might link development opportunities to a commercially viable product in order to encourage private sector interest and generate resources for project implementation.

Global Activities

Participants agreed that high-level, global discussions will be important. Some felt strongly that an opportunity would be missed if people only concentrate on project activities with specific technologies. Some of these participants preferred that a single multi-stakeholder global dialogue group address multiple issues in order to address the risks and benefits of nanotechnology at a sufficiently early stage so as to avoid the pitfalls and polemics that have affected other technologies. They added that the technology is evolving rapidly and society runs the risk of being confronted with practices that will be difficult to change once established (i.e. it is important to put in place policies, practices, etc. quickly, given the rapid development of the technology).

Other participants preferred to concentrate on project-level activities and address issues at a global level on an as needed and issue-specific basis (i.e., a single global dialogue group that addresses multiple issues may not be needed). Several participants reiterated that project-level activities may identify questions that are appropriate and tractable for global-level discussions.

Participants suggested these global meetings could address cross-cutting issues that emerge from project-level activities (i.e., similar issues emerging from one or more projects) as well as other issues that have been identified by a cross-section of stakeholders. Participants noted that global discussions could focus on a range of issues including but not limited to:

- Nomenclature;
- IP, technology transfer, and access to technology;
- Regulation (e.g., clarifying what regulations are needed);
- Early warning and early listening systems for new technology;
- Codes of conduct for responsible research and development;
- Risks of nanotechnology for marginalized people;
- Public policy that anticipates and addresses the linkage between nanotechnology and development (e.g., how to build nanotechnology into developing country policies);
- Privacy (e.g., effects of nano-sensors).

Given the nature of these issues, Meridian expects that global meetings would involve the same cross-section of stakeholders (e.g., companies, NGOs, academics, and governments), but would be comprised of different individuals and organizations (although it is likely that some organizations and individuals will participate in both meetings). Meetings would be focused on building relationships, exchanging information, and addressing the political, policy, institutional, technical, and economic dimensions of the issues.[6]

Meeting Themes

In addition to the specific comments above about project and global level activities, several themes emerged during the conversation. Some of these issues are particularly relevant to project activities, others to global-level activities, and some to both. These themes were:

- Information and mapping
- Awareness raising
- Networks and partners
- Capacity building (i.e., sustainability)

Information and Mapping

The Steering Group discussions indicated, despite the growing awareness about the implications of nanotechnology for people in the South, more information about nanotechnology, its applications, and how these might be relevant to problems of poor people in developing countries, is still needed. Some participants suggested that technology maps, which identify key problems, available solutions, and why problems have not been solved with existing technology, may prove helpful. These maps could also identify organizations that would be appropriate to engage in project-level activities (i.e., organizations with experience in human development issues, nanoscience and nanotechnology, and relevant cross-cutting issues such as regulation, risk research, etc.). In preparation for the SG meeting, Meridian collected extensive information about water, energy and health nanotechnology applications that could be used for such technology maps (Appendices B and C to the background paper distributed to SG members in advance of the meeting).

Building on a mapping exercise, multi-stakeholder groups would determine if nanotechnology might offer a sustainable solution considering technological, economic, commercial, organizational, and political aspects of a problem. Several participants suggested that any review of nanotechnology must include a comparison to existing alternatives, and assess whether investments in nanotechnology would have a greater impact on the lives of poor people if they were spent elsewhere. With the help of these maps, a group of stakeholders might develop specific projects that effectively link nanotechnology and development.

Awareness Raising

Many participants indicated that more work needs to be done in raising awareness in developing countries. Enhanced awareness and information about both opportunities and risks will enable communities, nations and society at large to engage in informed dialogue about nanotechnology, particularly the implications for developing countries.

Public engagement programs should examine the current knowledge baseline to determine what information is needed to enable informed discussion. Several countries and institutions are already implementing awareness programs. Some participants suggested that a workshop could be held to gather information on awareness programs world-wide and develop a benchmark.

[6] Meridian will continue to explore the possibility of a single multi-stakeholder global dialogue group to play a coordinating and guiding role to make sure that the experiences and results of various initiatives and projects around the globe are shared and taken into account in existing or new initiatives and projects as appropriate.

Networks and Partners

Participants stressed that sustainable partnerships will be required to implement projects and conduct effective global dialogue. Partnerships between organizations and individuals such as those participating in the Steering Group meeting (governments, companies, NGOs, donors, academics, etc.) will be needed to develop projects that meet the needs of people in developing countries. Participants suggested that, if a global dialogue group were formed by Meridian, it could play a useful role by connecting networks that have not and do not normally interact with one another. Participants noted that various existing initiatives are beginning to address issues,[7] and that any group or project convened by Meridian needs to carefully identify its niche.

Participants also suggested that a global group convened by Meridian might play a role in linking countries developing national nanotechnology strategies, donors with projects, academics and scientists with research funding, etc. Even though different countries and organizations have different priorities, they share common challenges. People stand to benefit from knowledge sharing networks that allow people to share information about various programs and activities and exploit synergies between them.

A participant pointed out that networks in many developing countries and developing regions exist at a different level than in developed countries. Networks are often organized around a certain discipline or social structure. Often, these networks are not of a multi-disciplinary let alone an interdisciplinary nature. Thus these countries and regions may need different types of support to help link the right communities of people.

Several participants mentioned the opportunities for South-South partnerships and cooperation, as well as possibilities for leveraging opportunities for North-South cooperation. Developing countries could look for strategic areas of cooperation and partnerships in the course of developing their own country-specific nanotechnology programs.

Capacity Building (i.e., sustainability)

Several participants mentioned that projects and policy frameworks should consider capacity building. Policies and projects should leave a structure behind that sustains itself. Capacity building might include training of scientists, government officials and local businesses. The projects should be responsive to the needs and priorities of the developing country in which it takes place, and the capacity building efforts should be poverty reduction oriented.

The design of the projects should take into account the different capacity building needs in different countries. On one end of the spectrum are developing countries that have capacity and are developing nanotechnology (e.g., South Africa, Brazil, China, India, and Mexico). On the other end of the spectrum are developing countries that have no or very limited nanotechnology capacity. Many developing countries find themselves somewhere in between these opposite ends of the spectrum.

One participant suggested that it might be helpful to build scenarios for introduction of nanotechnology in different types of countries with different capacities. The process of developing these scenarios is also a way to build capacity.

Other Issues

Project Name and Definitions

Some participants commented on the name of the project, global Dialogue on Nanotechnology and the Poor. Some felt that using the term “the poor” was denigrating. Others, including some participants from developing countries, felt that it was important that the name reflect the intended

[7] See Attachment 6 for some examples of relevant initiatives. Also attached are notes of the presentation by Dr. Mohamed Hassan, Third World Academy of Sciences (Attachment 4) and a hand-out with information regarding relevant EU policy documents from Renzo Tomellini, European Commission (Attachment 5). These materials are provided as further background about relevant initiatives and potential partner and/or network organizations.

outcome of the project – to help poor people in developing countries solve problems and thereby contribute to poverty eradication.

Other participants mentioned that using the term "nanotechnology" might be sensitive. Some technologies that have been around for some time could, technically, be classified as nanotechnologies. As they may have been on the market without having attracted much attention or causing problems, the product's manufacturers may not want to be pulled into the complex discussions about nanotechnology.

Dialogue Participants

Participants suggested that if a global dialogue group is convened, it should consist of a larger and more diverse group than the Steering Group. Members should include representatives from relevant initiatives as well as additional members from developing countries. Some suggested that more women be included in the discussions. Others felt that donors, companies and technology-skeptics should be better represented. Similar considerations would apply to project-level activities.

NEXT STEPS

The Steering Group convened by Meridian represented key stakeholder groups including companies, NGOs, academics, governments, and donors from the developed and developing world. The Steering Group represented a wide spectrum of viewpoints about the potential effects of this technology for developing countries. Meridian requested that Steering Group members bring forward their views in an open and frank fashion. As requested and expected, the SG offered a wide range of activities and viewpoints to help inform Meridian's decisions regarding the appropriate next steps for the Global Dialogue on Nanotechnology and the Poor, especially in regard to the appropriate substantive, scale, and temporal issues for dialogue among diverse stakeholders.

Based on the advice and input of the SG, Meridian plans to continue the Global Dialogue on Nanotechnology and the Poor, which will encompass a range of activities designed to generate and distribute information, raise awareness, and help stakeholders – companies, NGOs, academics, governments, and donors – make informed decisions about the issues at the nexus of nanotechnology and development, especially the potentially positive and negative effects of the technology for people in the South.

Meridian is now preparing to move ahead with activities at both the project and global level. Taken as a package, this collection of activities is designed to address the critical issues identified by the SG and the overall objectives of the GDNP. Meridian will be pursuing several of these activities immediately with available funding. Other activities will be pursued as additional funding is secured. Meridian believes that successfully addressing these issues will take a sustained commitment. Attachment 3 shows a graphical depiction, over a three year period, that illustrates a possible structure of activities that collectively would comprise the Global Dialogue on Nanotechnology and the Poor (the actual activities and sequencing may vary depending on stakeholder interest and funding).

This collection of project and global level activities are designed to:

- Identify specific opportunities and risks in priority issues areas;
- Generate information, raise awareness, foster linkages and inform decision making;
- Ground-truth opportunities and risks; and
- Address issues of global significance through multi-stakeholder discussions.

Identify Specific Opportunities and Risks in Priority Issue Areas

The GDNP will help assess the landscape by determining what nanotechnologies are most important for developing countries, from both an opportunities and risks perspective. Focused work will be conducted in areas that have generated interest and attention, including nanotechnology applications in substantive areas including, but not necessarily limited to water and agriculture.

Specific activities to be pursued include, but are not necessarily limited to the following.

Commissioned Papers

Meridian intends to commission papers on nanotechnology applications being developed or already commercially available in the fields of water and agriculture (i.e., commodities). These papers, which in the case of water, could build on the work performed by Meridian in advance of the SG meeting, would explore the maturity of nanotechnology applications (i.e., commercially available, available near-term, long-term) and the potential opportunities and risks these products may present for developing countries. The initial papers will likely be on water and commodities. These two substantive issue areas have been purposively chosen as a vehicle for comparing and contrasting nanotechnology applications that have been featured in many recent reports and conferences as products at opposite ends of the spectrum in terms of opportunities and risks. Specifically, many people believe nanotechnology water applications may have high short-term opportunities with minimal risks (water), while nanotechnology applications affecting commodity production and processing may have significant short-term socio-economic impacts. The authors will be specifically tasked with exploring opportunities and risks related to technological, economic, commercial, organizational, and political issues.

Workshops

Building on the commissioned paper, Meridian, in partnership with other organizations, intends to convene and facilitate pre-project workshops designed to further scope out nanotechnology applications relevant to specific substantive issues areas (e.g., water, commodities) and identify specific projects that would examine both the potential opportunities and risks of these nanotechnology products. As described more below, these pre-project workshops and projects will be designed to ground-truth increasingly frequent claims about both the opportunities and risks of nanotechnology for developing countries in papers and conferences.

These pre-project workshops would involve individuals and organizations with specialized substantive expertise (e.g., water, commodities) as well as wide range of people with development, poverty reduction, business, technology introduction, and nanotechnology experience. Workshops will be conducted in developing countries.

Ground-Truth Opportunities and Risks

If the commissioned papers and multi-stakeholder pre-project planning workshops lead to specific on-the-ground projects, the GDNP may continue to convene multi-stakeholder processes to monitor and learn from the benefits and risks emerging from these projects and bring those lessons into relevant global discussions. The projects will be designed to reveal and assess specific opportunities and risks that specific nanotechnology products may present for developing countries. As appropriate, these opportunities and risks will be addressed at both a project and global level. The precise role of the GDNP in a project will depend heavily on the nature of the substantive issues, interest among other individuals and institutions playing a leadership role, and the precise objectives of the project (e.g., the role of the GDNP in a project to identify and assess water technologies may be very different than the role of the GDNP in a project to identify mechanisms for anticipating socio-economic impacts of nanotechnology on the textile or rubber industry).

Meridian proposes that the first two projects focus on water and commodities, assuming that commissioned papers and pre-project workshops support further exploration of these issues. As noted above, these two substantive issue areas have been chosen as a vehicle for comparing and contrasting nanotechnology applications that have been featured in many recent reports and conferences at opposite ends of the spectrum in terms of opportunities and risks. Specifically, many people believe nanotechnology water applications may have strong short-term opportunities with minimal risks, while nanotechnology applications affecting commodity production and processing may have significant short-term socio-economic impacts. These two projects will enable people with differing views about the positive or negative effects of the nanotechnology for developing countries to explore the issue from a tangible and practical perspective.

While the precise focus of projects is dependent on the precursor commissioned papers and pre-project workshops, some people have suggested that a water project could focus on matching nanotechnology products (e.g., filters) to specific humanitarian problems (e.g., arsenic contamination of water) and then assessing the opportunities and risks of these specific nanotechnology products. A project on commodities may be more broadly focused on identifying mechanisms for anticipating the socio-economic impacts of specific nanotechnology products or classes of products on the textile and rubber industry, long before there are potentially negative economic consequences for a country's economy.

In addition to projects on water and commodities, Meridian will consider catalyzing projects in other issues areas that have generated significant interest including but not limited to health and energy.

Generate Information, Raise Awareness, Foster Linkages and Inform Decision Making

The GDNP will generate information and raise awareness to help society engage in informed dialogue about the implications – opportunities and risks – of nanotechnology for developing countries.

Specific activities to be pursued include, but are not necessarily limited to the following.

<u>Nanotechnology and Development News Service</u>

Meridian Institute, with support from the UK Department for International Development, will launch in late 2005 "Nanotechnology and Development News," a daily email news service that will provide information about the most important technical, policy, regulatory, political, and socio-economic issues at the nexus of nanotechnology and development. The news service will be designed to raise awareness about nanotechnology issues among people in governments, industry, academia, international institutions, non-governmental organizations (NGOs) and others that have been traditionally focused on development and raise awareness about development issues among people that have been traditionally focused on nanotechnology, or science and technology issues more broadly. The daily news summaries will also be available through a web portal and RSS (Really Simple Syndication) news feed.

The specific goals of Nanotechnology and Development News include the following.

- Provide timely and balanced information about nanotechnology and development issues to meet the needs of governments, academics, industry, and NGOs in developing and developed countries;
- Enhance transparency in nanotechnology and, more broadly, science and technology, decision-making and contribute to informed public debate;
- Foster partnerships and networks among people interested in development, science and technology, and nanotechnology.

Commissioned Papers

The commissioned papers, described above, provide another vehicle for generating information, raising awareness, and informing decision making.

"Add-On Sessions" at Planned Meetings

Meridian will approach, as appropriate, organizers of other meetings on nanotechnology and/or development issues to include sessions or agenda topics focused specifically exploring the potential opportunities and risks of nanotechnology for people in the South. As possible, Meridian will organize sessions to involve stakeholders with different perspectives on the potential effects of nanotechnology for developing countries, in an effort to raise general societal awareness about the range of views about this potentially far-reaching issue.

Network of Networks

To foster linkages, synergies, and coordination, Meridian intends to convene occasional meetings of leaders from existing initiatives that are relevant to the issue of "nanotechnology and the poor" (e.g., GDNP, NanoDialogues, inter-governmental process, OECD, Global Research Alliance, International Council on Nanotechnology, etc.). These meetings will be designed to ensure efficient use of donor resources and minimize, to the extent appropriate, competing and overlapping initiatives.

South-South Nanotechnology Meeting

Meridian intends to convene a meeting of leaders of national nanotechnology programs in developing countries, along with representatives from industry, civil society, and academia to exchange information, share lessons, etc.

Advisory and Informational Meetings

Meridian will convene, as requested, small groups comprised of diverse stakeholders to inform decision making by bi-laterals, foundations, governments, etc. about nanotechnology and related investments, particularly activities that would affect poor people in developing countries.

Address Issues of Global Significance

In addition to the specific issues of global significance that emerge from project-level activities, Meridian will, taking stock of other existing and relevant initiatives (e.g., inter-governmental process), convene a series of global meetings on specific issues such as intellectual property rights or regulation. While some participants advocated a single global dialogue group that would address multiple issues, a majority of participants suggested that multiple global discussions of one another could be organized and convened.

Meetings on Cross-Cutting Issues of Global Significance

Meridian intends to convene multi stakeholder meetings on issues of global significance. These meetings will be designed to address cross-cutting issues that emerge from project-level activities (i.e., similar issues emerging from one or more projects) as well as other issues that have been identified by a cross-section of stakeholders. While the SG identified a long list of potential topics for these global meetings, Meridian proposes convening two global meetings; one meeting focused on regulatory initiatives related to nano-particles and nano products and a second meeting on intellectual property rights, technology transfer, and access to technology.

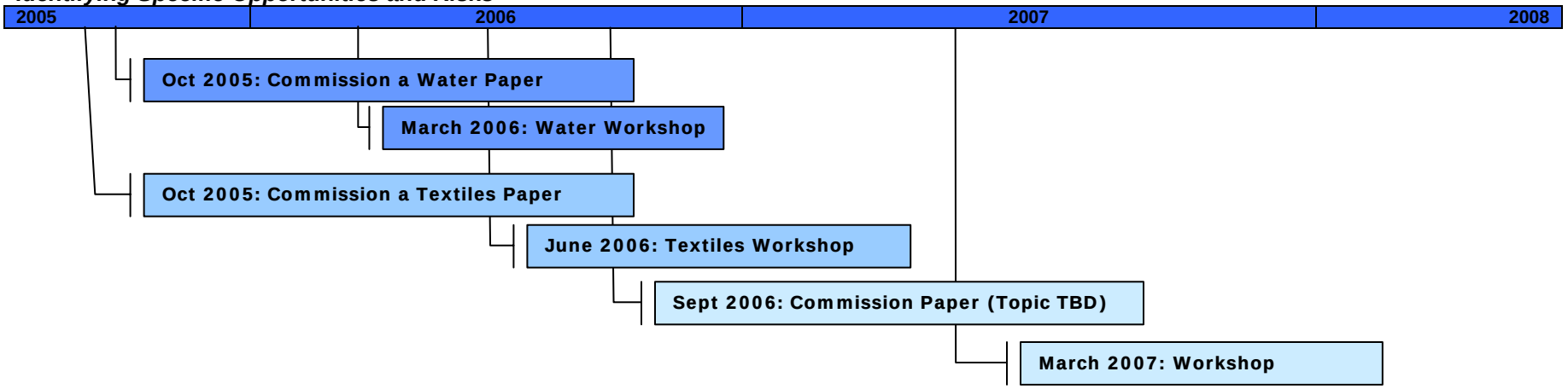
Given the nature of these issues, Meridian expects that the meetings will involve the same cross-section of stakeholders (e.g., companies, NGOs, academics, and governments), but will be comprised of different individuals and organizations (although it is likely that some organizations and individuals will participate in both meetings).

The meeting on regulatory initiatives will bring together a group of government, NGO, company, and academic leaders who are exploring domestic regulatory frameworks for nano-particles and other nanotechnology products. Specifically, Meridian proposes bringing together individuals from the US, Europe, Japan and other developed countries that are considering regulations for nano-particles and nanotechnology products with individuals from developing countries and countries with economies in transition who are now at the nanotechnology forefront such as South Africa, Brazil, India, China, and others. The workshop would be designed to foster on-going relationships and information sharing among these individuals and initiatives.

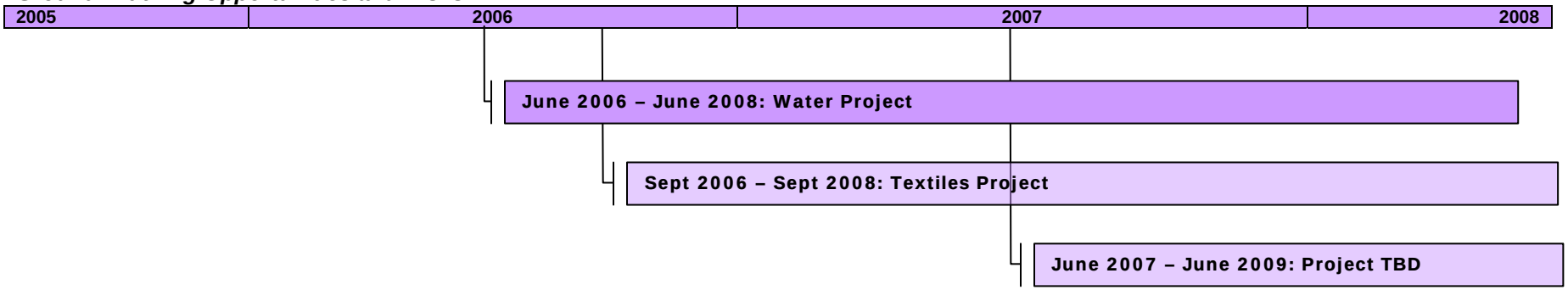
Meetings will be designed to build relationships, exchange information, and address the political, policy, institutional, technical, and economic dimensions of the issues.

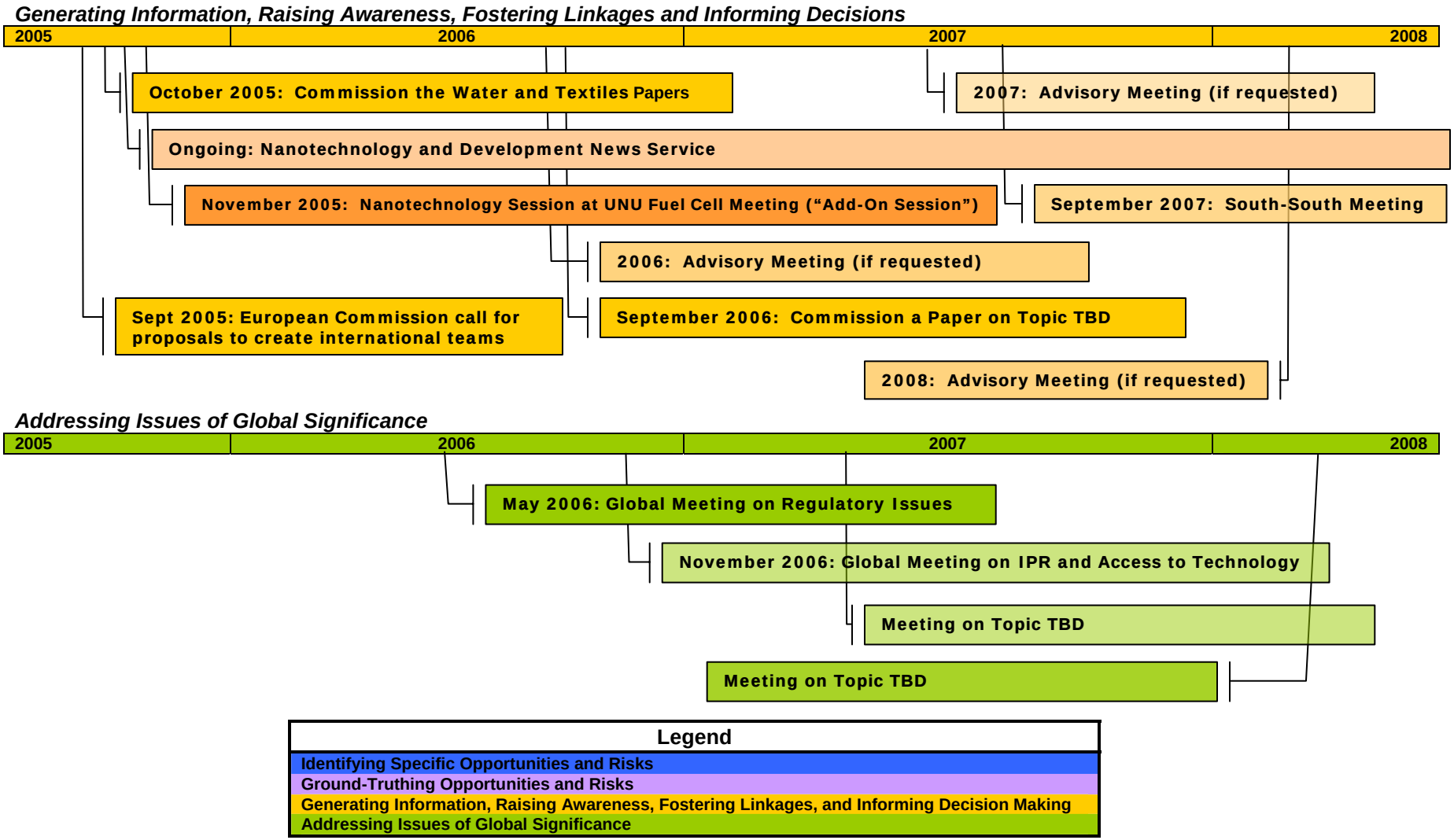
The meeting on intellectual property rights, technology transfer, and access to technology will be designed specifically to address issues about these topics, which emerge in the commissioned papers, workshops, or projects.

Identifying Specific Opportunities and Risks



Ground-Truthing Opportunities and Risks




Generating Information, Raising Awareness, Fostering Linkages and Informing Decisions
2005
2006
2007
2008
October 2005: Commission the Water and Textiles Papers
2007: Advisory Meeting (if requested)
Ongoing: Nanotechnology and Development News Service
November 2005: Nanotechnology Session at UNU Fuel Cell Meeting ("Add-On Session")
September 2007: South-South Meeting
2006: Advisory Meeting (if requested)
Sept 2005: European Commission call for proposals to create international teams
September 2006: Commission a Paper on Topic TBD
2008: Advisory Meeting (if requested)
Addressing Issues of Global Significance
2005
2006
2007
2008
May 2006: Global Meeting on Regulatory Issues
November 2006: Global Meeting on IPR and Access to Technology
Meeting on Topic TBD
Meeting on Topic TBD
Legend
Identifying Specific Opportunities and Risks
Ground-Truthing Opportunities and Risks
Generating Information, Raising Awareness, Fostering Linkages, and Informing Decision Making
Addressing Issues of Global Significance

Attachment 1
Meridian Institute Global Dialogue on Nanotechnology and the Poor: Opportunities and Risks
Steering Group Participant List

Satyabrata Acharyya
Programme Director
PRADAN
Flat No. 1, Chetna Apartments
Circular Road, At & P.O.
B. Deoghar Jharkhand 814 112, India
phone number: 91-06432-231355
e-mail: satya@pradan.net

Carlos Aguirre
National Director for Academic Planning
Catholic University of Bolivia
PO Box 4805
La Paz, Bolivia
phone number:
fax number:
e-mail: caguirre@ucb.edu.bo

Gordon Conway
Chief Scientific Adviser
Department for International Development
1 Palace Street
London SW1E 5HE, United Kingdom
phone number: 44-20-7023-0220
fax number: 44-20-7023-0330
e-mail: g-conway@dfid.gov.uk

Cylon Gonçalves Da Silva
National Secretary
Ministry of Science and Technology
Bloco E Room 214
Brasilia DF 70067-900, Brazil
phone number: 55-61-317-8128
fax number: 55-61-226-0834
e-mail: cylon@mct.gov.br,
cylon@nano.org.br

Tim Harper
Chief Executive Officer
Cientifica
C/O Communidad de Madrid, 35 BIS,
Oficina 19-20
Edificio BurgoSol, C/Communidad de
Madrid
Las Rozas 28230 Madrid, Spain
phone number: 34-91-640-7185
fax number: 34-91-640-7186
e-mail: tim.harper@cientifica.com

Mohamed H.A. Hassan
Executive Director
Third World Academy of Sciences
C/O ICTP
Strada Costierra 11
34014 Trieste, Italy
phone number: 39-040-2240-327
fax number: 39-040-224-559
e-mail: mhassan@twas.org,
twas@ictp.trieste.it

Thembela Hillie
Chair, Nanotechnology
CSIR
PO Box 395
Pretoria 0001 ZA, South Africa
phone number: 27-12-841-3874
fax number: 27-12-841-2131
e-mail: thillie@csir.co.za

Sisule Musungu
Team Leader, Intellectual Property,
Investment, and Technology Transfer
Programme on International Trade and
Development
South Centre
CP 228
1211 Geneva 19, Switzerland
phone number: 41-22-791-8165
fax number: 41-22-798-8531
e-mail: musungu@southcentre.org
(unable to attend)

Mark Mitchnick
Chief Science Officer
International Partnership for Microbicides
1010 Wayne Avenue, Suite 1450
Silver Spring, MD 20910
phone number: 631-329-3255
fax number: 631-3298962
e-mail: mmitchnick@sunsmart.com

Attachment 1
Meridian Institute Global Dialogue on Nanotechnology and the Poor: Opportunities and Risks
Steering Group Participant List

Pat Mooney
Executive Director
ETC Group
1 Nicholas Street, Suite 200B
Ottawa, ON K1N 7B7, Canada
phone number: 613-241-2267
fax number: 613-241-2506
e-mail: etc@etcgroup.org

Peter O'Neill
Deputy Head
Central Research Department
Department for International Development
1 Palace Street
London SW1E 5HE, United Kingdom
phone number: 44-20-7023-0430
fax number:
e-mail: P-ONeill@dfid.gov.uk

Frank Rijsberman
Director General
International Water Management Institute
PO Box 2075
Colombo, Sri Lanka
phone number: 94-11-278-7404
fax number: 94-11-278-6854
e-mail: f.rijsberman@cgiar.org

Christopher Rothfuss
AAAS Science and Technology Diplomacy Fellow
Office of Space and Advanced Technology
U.S. Department of State
1990 K Street NW, Suite 410
Washington, DC 20006
United States
phone number: 202-663-2399
fax number: 202-663-2402
e-mail: rothfusscj@state.gov

Fabio Salamanca-Buentello*
Joint Centre for Bioethics
University of Toronto
88 College Street
Toronto, Ontario M5G 1L4
Canada
phone number: 416-963-8902
fax number:
e-mail: f.salamanca.buentello@utoronto.ca

Dave Sands
Start Business Manager
Shell Global Solutions International BV
Stichtage Building
Koningin Juliapaplein 15, PO Box 336
The Hague, 2501 CH
The Netherlands
phone number: 31-70-377-5368
fax number: 31-65-5124325
e-mail: dave.sands@shell.com

Andrew Scott
Policy and Programmes Director
Intermediate Technology Development Group
Schumacher Centre for Technology Development
Bourton Hall
Bourton-on-Dunsmore
Warwickshire CV23 9QZ
United Kingdom
phone number: 44-1926-634-400
fax number: 44-1926-634-401
e-mail: andrew.scott@itdg.org.uk

Renzo Tomellini*
Head, Nanosciences and Nanotechnologies
European Commission
Research Directorate-General
Rue de la Loi, Wetstraat 200
B-1050 Brussels, Belgium
phone number: 32-2-296-0136
fax number: 32-2-299-1848
e-mail: Renzo.Tomellini@cec.eu.int
www.cordis.lu/nanotechnology

* *observers*

Attachment 1
Meridian Institute Global Dialogue on Nanotechnology and the Poor: Opportunities and Risks
Steering Group Participant List

Mark Welland
Director of the IRC in Nanotechnology
University of Cambridge
11 J J Thomson Avenue
Nanoscience Centre, Madingley Road
Cambridge CB3 0FF, United Kingdom
phone number: 44-1223-760305
fax number: 44-1223-760306
e-mail: mew10@eng.cam.ac.uk

Jacob Werksman
Senior Advisor
Global Inclusion
The Rockefeller Foundation
420 Fifth Avenue
New York, NY 10018
USA
phone number: 1-212-852-8212
fax number: 1-212-852-8461
e-mail: jwerksman@rockfound.org

Jean Woo
International Development Research Centre
250 Albert Street
Ottawa, ON, Canada K1P 6M1
phone number: 613-236-6163
fax number: 613-567-7748
e-mail: jwoo@idrc.ca

Rebekah Young
World Business Council for Sustainable Development
4, chemin de Conches
1231 Conches-Geneva, Switzerland
phone number: 41-22-839-3100
fax number: 41-22-839-3131
e-mail: young@wbcsd.org

Attachment 1
Meridian Institute Global Dialogue on Nanotechnology and the Poor: Opportunities and Risks
Steering Group Participant List

Project Team

Todd Barker
Partner
Meridian Institute
29 Tarbox Road
Jericho, VT 05465
United States
phone number: +1-802-899-2625
e-mail: tbarker@merid.org

Michael Lesnick
Senior Partner
Meridian Institute
863 Rodney Drive
Nashville, TN 37205
United States
phone number: +1-615-353-0854
fax number: +1-615-353-2704
e-mail: mlesnick@merid.org

Tim Mealey
Senior Partner
Meridian Institute
1920 L Street NW, Suite 500
Washington, DC 20036
United States
phone number: +1-202-354-6454
fax number: +1-202-354-6441
e-mail: tmealey@merid.org

Rex Raimond
Facilitator
Meridian Institute
PO Box 1829
Dillon, CO 80435
United States
phone number: +1-970-513-8340 x 230
fax number: +1-970-513-8348

Shawn Walker
Project Coordinator
Meridian Institute
1920 L Street NW, Suite 500
Washington, DC 20036
United States
phone number: +1-202-354-6450
fax number: +1-202-354-6441
e-mail: shawnwalker@merid.org

Lloyd Timberlake
Independent Consultant
112 Devon Court
Silver Spring, MD 20910
United States
phone number: +1-301-589-7501
fax number: +1-301-589-7501
e-mail: Lloyd.Timberlake@aaa-net.com

Global Dialogue on Nanotechnology and the Poor (GDNP)
Opportunities and Risks

Draft Agenda
Steering Group Meeting

22-23 June 2005
London, England

Meeting Objectives

The objectives of the GNDP Steering Group meeting are to solicit advice from Steering Group about the following issues.

1. Review purpose, goals, intended outcomes and timeline of the GDNP.
2. Determine focus areas for the GDNP and identify projects and activities in these focus areas that the GDNP could pursue to achieve its goals.
3. Provide advice on organizing and structuring multi-stakeholder and other meetings, including meeting format(s), timing, locations, participants, background materials, etc. to achieve GDNP goals.
4. Suggest possible strategies for addressing cross-cutting issues that may arise in the context of specific projects and activities (e.g., IPRs, access to journals and data).
5. Discuss what the GDNP can do to improve the role of science and technology in development.
6. Identify donors that may be interested in the GDNP.

Background Materials for Steering Group Meeting

- Background Paper prepared for Steering Group
- Meridian Institute's Paper "Nanotechnology and the Poor: Opportunities and Risks – Closing the Gaps Within and Between Sectors of Society."

Wednesday, 22 June 2005

13:45 Welcome, introductions, agenda review, and Steering Group objectives

14:15 Introduction to the Global Dialogue on Nanotechnology and the Poor (GDNP)

Brief presentation by Meridian, followed by discussion, about the GDNP:

- History;
- Purpose and goals;
- Intended outcomes; and
- Proposed timeline.

Meridian Institute's presentation will include a summary of conclusions drawn from our in person, telephone, and online consultations, which indicate that the GDNP should focus on a limited number of issues that are widely agreed to be among the most significant issues in developing countries.

15:15 Discussion: Focus of GDNP and Associated Projects and Activities

Given the GDNP's purpose, goals, and intended outcomes, as well as Meridian's analysis of feedback received, we will seek advice from the Steering Group on how to focus the GDNP.

Substantive focus:

- Should the GDNP initially focus on **water, energy**, or perhaps one other substantive issue (e.g., agriculture or health)?

Temporal focus:

- Should the GDNP focus on projects that would assess the opportunities and risks **near-term** nanotechnology applications may present in regard to addressing these problems?

Specific projects:

People have suggested that within the selected focus areas specific projects be developed. Projects could be designed to identify a specific problem(s) (e.g., arsenic in groundwater) for which no adequate technical solution exists.

Projects would focus on specific actions that address the technological, social, educational, economic, institutional, policy, legal, and other issues necessary for enabling the linkage between the specific problem and development and/or implementation of nanotechnology applications. Meridian would seek advice on the following issues:

- Within the selected focus areas, what specific **real-world problems** exist for which nanotechnology applications might play a role?
- Within the selected focus areas, are there **nanotechnology applications,** which are already available or in development, that could help address real-world problems within the selected focus areas?
- What would be the appropriate **next steps** in developing specific projects that examine the opportunities and risks that emerge when specific real-world problems are linked with specific nanotechnology applications?

Geographic focus:

- Should the GDNP focus on specific **regional or sub-regional** areas?

Implementation focus:

- How can these projects and activities best be integrated in existing initiatives, including national nanotechnology initiatives?

16:00 Break

16:15 Discussion: Focus of GDNP and Associated Projects and Activities (continued)

17:15 Summary and Agenda Preview for Day 2

17:30 Adjourn

18:00 COCKTAILS AND HORS D'OEUVRES

Thursday, 23 June 2005

09:00 Discussion: Organization and Structure of GDNP Meetings

Given the GDNP's purpose, goals, timeline and focus, we will seek advice from the Steering Group on how to structure the next phase of the GDNP.

1. Should the first meeting be in the form of a multi-stakeholder dialogue or should it be preceded by some other form (e.g., regional consultations, stakeholder group caucuses, etc.)?
2. What should happen after the first meeting (e.g., regional consultations, working groups, caucuses, etc.)?
3. What might be objectives and intended outcomes of each meeting?
4. When should the first meeting and follow-up events take place (or not take place because of other events)?
5. Where should meetings be held?
6. Which individuals and organizations should be invited to these meetings?
7. Who else may have an interest in learning about the GDNP?
8. What information would be useful to provide to the participants in GDNP meetings?

10:30 Break

10:45 Discussion: GDNP Structure (continued)

11:30 Discussion: Cross-Cutting Issues

A number of cross-cutting issues (i.e., issues relevant to a range of substantive areas, projects and both near- and long-term forms of nanotechnology) may arise in the context of further dialogue on specific projects and problems. We will ask for suggestions from the Steering Group on the following issues:

1. When cross-cutting issues come up in the context of specific projects, what types of strategies might be used to address them? For instance, should the GDNP address certain issues directly, should the GDNP make explicit connections to other initiatives that might help to address certain issues, other?
2. Should the GDNP deal with cross-cutting issues above and beyond addressing them in specific projects? For instance, should GDNP make some kind of explicit connection to nanotechnology standard setting, risks assessment and other processes?

12:15 Lunch

13:30 Discussion: The Role of Science and Technology in Development

What can the GDNP, through its focus on nanotechnology, do to improve the role of science and technology in development?

14:15 Discussion: Funding for the GDNP

With greater clarity on the prospective activities of the GDNP, we will seek advice from the Steering Group on the elements of a fundraising strategy.[8]

[8] Initial funding for the GDNP has been provided by The Rockefeller Foundation (USA) and the International Development Research Centre (IDRC, Canada).

1. What funding organizations (international and bi-lateral donors, private foundations, etc.) might be interested in supporting the GDNP?
2. How should the GDNP approach these potential funders?

15:00 Summarize Next Steps

15:15 Steering Group Role in Supporting GDNP Next Steps

What role can Steering Group members play to help Meridian mobilize the necessary support and interest in the GDNP?

15:45 Closing Comments

16:00 Adjourn

GDNP Steering Group Meeting
22 – 23 June 2005
London

Global Dialogue on Nanotechnology and the Poor: Opportunities and Risks

Meridian Institute

Slide 1

Meeting Objectives

1. Review purpose, goals, intended outcomes and timeline of the GDNP.
2. Determine **focus areas** for the GDNP and identify **activities** in these focus areas that the GDNP could pursue to achieve its goals.
3. Provide advice on **organizing and structuring multi-stakeholder and other meetings**, including meeting format(s), timing, locations, participants, background materials, etc. to achieve GDNP goals.
4. Suggest possible strategies for addressing **cross-cutting issues** that may arise in the context of specific projects and activities (e.g., IPRs, access to journals and data).
5. Discuss what the GDNP can do to improve the role of **science and technology in development**.
6. Identify **donors** that may be interested in the GDNP.

Meridian Institute

Slide 2

Intended Outcomes

- An **action plan** for governments, industry, NGOs, universities, etc. that addresses opportunities and risks
  - Clear direction
  - Specific next steps
  - Timeline

Meridian Institute

Slide 3

Conclusions from Various Consultations: Focus

- Substantive focus:
  - Should the GDNP initially focus on **water, energy**, or perhaps one other substantive issue (e.g., agriculture or health)?
- Temporal focus:
  - Should the GDNP focus on projects and activities that would assess the opportunities and risks **near-term** nanotechnology applications may present in regard to addressing these issues (e.g., water)?
- Geographic focus:
  - Should the GDNP focus on specific **regional or sub-regional** areas?
- Implementation focus:
  - How can these projects and activities take account of and, as appropriate, link to **existing initiatives**, including national nanotechnology initiatives?

Meridian Institute

Slide 4

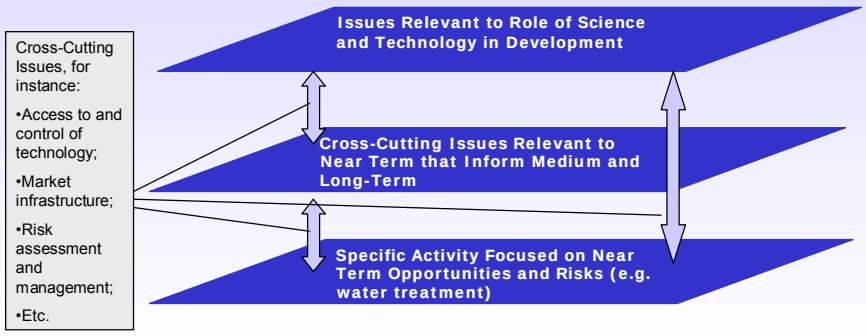
Actions and Activities

1. Identify specific **activities** focused on near-term opportunities and risks (*activities could be designed to identify a specific problem(s) for which no adequate solution exists*)
2. Structure discussions about near-term cross-cutting issues so they inform discussions about **medium- and long-term** issues
3. Look for ways to illuminate/illustrate/clarify the **role of science and technology** in development

Meridian Institute

Slide 5

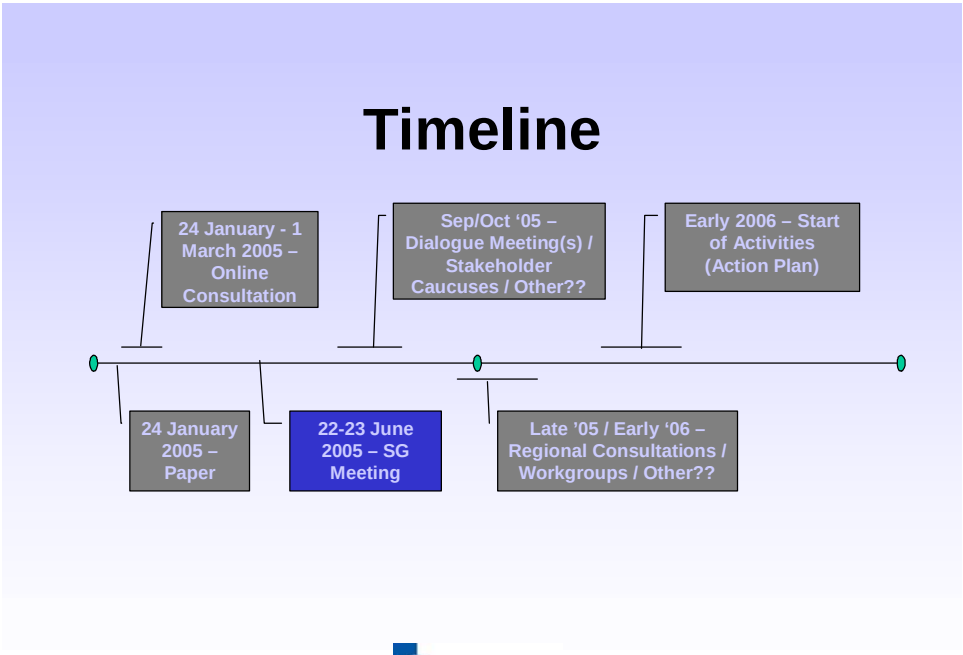
Conceptual Framework



Meridian Institute

Slide 6

Attachment 3
Meridian Institute Global Dialogue on Nanotechnology and the Poor: Opportunities and Risks
Powerpoint Slides used for Meridian's Introducton to the GDNP



On the morning of Thursday, 23 June 2005, Mohamed Hassan, Executive Director of the Third World Academy of Sciences (TWAS) joined the Steering Group via telephone conference. He made a brief presentation highlighting TWAS' efforts to promote nanoscience in developing countries.

Dr. Hassan explained that several developing countries, including South Africa, China, India, and Brazil are among the global leaders in nanoscience and nanotechnology. However, most developing countries are not aware of nanoscience and nanotechnology. To avoid the formation of a South-South nanodivide, Dr. Hassan suggests that at least three issues need to be addressed:

- Increase awareness of the benefits of nanotechnology to developing countries;
- Develop approaches to train nano-scientists in developing countries; and
- Promote collaboration to solve specific problems.

TWAS is taking the following actions to promote South-South collaboration on nanoscience and nanotechnology:

- Identify leading institutions in developing countries;
- Establish a network of these institutions (South Nano Networks);
- Set up a Steering Group consisting of representatives from these network institutions (possibly chaired by C.N.R. Rao, President of TWAS Council and Professor at Jawaharlal Nehru Centre for Advanced Scientific Research)
- Develop a major program for training of scientists and researchers (possibly with help from institutions in India, China, Mexico);
- Encourage members of the network to collaborate on specific projects. Projects would receive merit-based, competitive grants.

Dr. Hassan mentioned that North-South global collaboration is also needed to enhance capacity of developing countries to use nanotechnology to their benefit and avoid potential risks associated with specific technologies.

To build capacity for nanoscience and technology and facilitate coordination and international cooperation, Dr. Hassan suggested that countries support the development of regional centers of excellence in nanotechnology in Africa. The idea for regional centers of excellence has been proposed by NEPAD (the New Partnership for Africa's Development) and the United Kingdom's Commission for Africa.

Dr. Hassan suggested that a web-portal aimed at students in developing countries could be established as a tool for coordination, research cooperation, and training.

Dr. Hassan stressed that awareness and understanding of nanotechnology are key. TWAS is working on a series of publications, and exploring the possibility of radio and TV broadcasts about nanotechnology aimed at people in developing countries. He suggested that regional roundtables between decision makers, nanotechnologists, the development community, private sector and civil society will greatly contribute to increasing awareness and understanding of nanotechnology.

Dr. Hassan mentioned that his article on nanotechnology and development will be published in the July 1, 2005 edition of Science Magazine.[9]

[9] The article is available to subscribers at: http://www.sciencemag.org/cgi/reprint/309/5731/65.pdf.

EU policy documents on nanotechnology are posted on http://www.cordis.lu/nanotechnology/actionplan.htm. Relevant policies include, for instance, paragraph 7 of the European Action Plan[10]:

> **7. INTERNATIONAL COOPERATION**
>
> International cooperation in nanosciences and nanotechnologies (N&N) is needed both with countries that are economically and industrially advanced (to share knowledge and profit from critical mass) and with those less advanced (to secure their access to knowledge and avoid any 'nano divide' or knowledge apartheid). Particular attention will be paid to cooperation with countries covered by the European Neighbourhood Policy and those with existing S&T cooperation agreements.
>
> 7.1 In compliance with its international obligations and notably those relating to the World Trade Organisation, the Commission will:
> a) Intensify dialogue at international level with a view to adopting a declaration or a 'code of good conduct' for the responsible development and use of N&N. Industry shall be invited to adhere to these principles;
> b) Address issues of mutual benefit at global level e.g. on nomenclature, metrology, common approaches to risk assessment and the establishment of a dedicated database to share toxicological and ecotoxicological as well as epidemiological data;
> c) Support the creation of a free and open European electronic archive of N&N scientific and technical publications according to the principles set out in the OECD Declaration on Access to Research Data from Public Funding25.
>
> 7.2 The Commission calls upon the Member States:
> To increase their support for N&N R&D and capacity building in less developed countries. It highlights the potential of N&N to contribute towards the Millennium Development Goals and sustainable development e.g. as regards water purification, providing high quality and safe nutrition, more effective delivery of vaccines, lower cost health screening, more efficient conservation and use of energy.

EU Funding Documents Relevant to Nanotechnology and International Cooperation

Funding for international cooperation projects can be granted via the EU framework programmes. See, for instance, the Sixth Framework Work Programme "Integrating and strengthening the European Research Area; Nanotechnology and nanosciences, knowledge-based multifunctional materials, new production processes and devices"[11]:

> **1.4.5.3 Cooperation with Third Countries in the field of nanotechnology, advanced multi-functional materials and new ways of production research – SSA**
>
> Expanding the frontiers of knowledge requires substantial effort in terms of e.g. creativity, scientific and technical talents, availability of high quality infrastructures, financial resources and understanding of possible implications. Valuable synergy can be achieved at international level. For this purpose, appropriate contacts should be established amongst European researchers and research teams from Third Countries. The expected SSA should consist of actions and initiatives to foster real and effective cooperation at the level of research teams with a view to creating international teams of excellence in the fields covered by Priority 3, stimulating the participation of Third Countries where real

[10] Communication from the Commission to the Council, The European Parliament and the Economic And Social Committee; Nanosciences and nanotechnologies: An action plan for Europe 2005-2009. Available at: ftp://ftp.cordis.lu/pub/nanotechnology/docs/nano_action_plan2005_en.pdf.
[11] Available at: http://fp6.cordis.lu/nmp/call_details.cfm?CALL_ID=182.

added value can be ensured. Co-operation with Third "INCO" Countries (Russia, New Independent States, Southwest Balkans, Mediterranean Countries, Developing Countries) is particularly encouraged and these countries are eligible for receiving European Community funding, according to the appropriate rules under the current Framework Programme.

This attachment provides brief descriptions of a select number of initiatives that may be relevant to the GDNP. Meridian collected this information and provides it with the intent of creating linkages, where appropriate, and avoiding unnecessary overlap and duplication with existing initiatives. This is not intended to be an exhaustive list of relevant initiatives; we welcome suggestions for other relevant initiatives.

Nanotechnology and Development

- **Global Research Alliance**

  The Global Research Alliance (GRA; http://www.research-alliance.net) is an initiative of nine knowledge-intensive technology organizations from around the world: Battelle Memorial Institute – USA; CSIRO – Australia; CSIR – India; CSIR – South Africa; Danish Technological Institute (DTI); Fraunhofer-Gesellschaft - Germany; Netherlands Organisation for Applied Scientific Research (TNO); SIRIM-Berhad – Malaysia and the Technical Research Centre of Finland (VTT)..

  The GRA is committed to supporting the Millennium Development Goals, by undertaking large-impact projects for the benefit of society; creating synergy by pooling the energies, skills and facilities of participants; promoting projects with high innovation content; and developing global knowledge networks for industry and industrial sectors to enhance their competitiveness.

  The GRA has identified five focus areas in which it has been developing projects: water; energy; transport; digital futures; and health. The GRA is now embarking on the next stage of integrating and implementing cross-cutting initiatives between these five focus areas to foster creative synergies to address whole issues. One of its four "High Impact Integrated Projects" is a project on pro-poor nanotechnology.

- **Inter-Governmental Process on Responsible Research and Development of Nanotechnology**

  Government representatives of twenty five countries and the European Union participated in the International Dialogue on Responsible Research and Development of Nanotechnology. The International Dialogue took place on 17-18 June 2004 and was aimed at discussing how to best ensure that nanotechnology R&D programs are carried out in a responsible manner (the meeting summary is available at: http://www.nanoandthepoor.org/international.php).

  Meeting participants agreed that a preparatory group should be formed to explore possible actions, mechanisms, timing, institutional frameworks, and principles for ongoing international dialogue, cooperation and coordination in the area of responsible R&D of nanotechnology. It was proposed that the preparatory group be organized around three large regions (North and South America; Europe and Africa; and Asia and Oceania), and that it should prepare a draft plan of action for continued dialogue and cooperation, as well as a joint declaration and a procedure for its adoption.

- **New Partnership for Africa's Development (NEPAD)**

  During the First NEPAD Ministerial Conference on Science and Technology in November 2003, the Ministers adopted the outline for a plan of action that states that: "the application of laser technology to manufacturing technology and medical applications as well as to emerging technologies such as nanotechnology could enable Africa to strengthen its manufacturing capacity, as well as to leapfrog to the forefront of global technology trends. The Ministers also resolved to build regional consensus and strategies to address concerns emerging with

advances in new technologies, including biotechnology, nanotechnology, and information and communications technologies.

NEPAD (http://www.nepad.org) is both a vision and strategic framework for africa's renewal. The NEPAD strategic framework document arises from a mandate given to the five initiating Heads of State (Algeria, Egypt, Nigeria, Senegal, South Africa) by the Organisation of African Unity (OAU) to develop an integrated socio-economic development framework for Africa. The 37th Summit of the OAU in July 2001 formally adopted the strategic framework document.

National Nanotechnology Initiatives

A host of countries, including developing countries, have or are developing national strategies and policies regarding nano-science and nanotechnology. For instance, twenty five countries and the European Union, all with significant nanotechnology research and development (R&D) programs, participated in a meeting on 17-18 June 2004 to discuss how to best ensure that such programs are carried out in a responsible manner. The meeting brought together governmental representatives from the following 25 countries and one regional body:

- Argentina
- Australia
- Austria
- Belgium
- Brazil
- Canada
- China: Taipei
- Czech Republic
- European Union
- France
- Germany
- India
- Ireland
- Israel
- Italy
- Japan
- Korea
- Mexico
- The Netherlands
- New Zealand
- Romania
- Russia
- South Africa
- Switzerland
- United Kingdom
- United States

Information about these countries' nanotechnology programs is available at: http://www.nanoandthepoor.org/international.php.

Environmental and Human Health Risks

- **International Council on Nanotechnology (ICON)**

Managed by Rice University's Center for Biological and Environmental Nanotechnology in the USA, ICON (http://icon.rice.edu) activities ensure effective nanotechnology stewardship through risk assessment, research and communication. ICON's mission is to assess, communicate, and reduce nanotechnology environmental and health risks while maximizing its societal benefit.

ICON achieves its mission through: science and engineering research into the environmental and health impacts of engineered nanostructures; social science research into public acceptance of new technology, and the role that regulation and government policies can and should play; collaborative policy activities that develop international standards for engineered nanostructure terminology, safety guidelines, and best laboratory practices; public communication and outreach that tracks all relevant technical data on nanotechnology's risks and presents this information in a format accessible to non-specialists.

- **International Life Sciences Institute (ILSI)**

ILSI's Risk Science Institute formed the Nanomaterial Toxicity Screening Working Group (http://rsi.ilsi.org/index.cfm?pubentityid=300), which will develop a screening strategy for the hazard identification of engineered nanomaterials. The working group had its inaugural meeting in February 2005.

ILSI is a nonprofit, worldwide foundation that seeks to improve the well-being of the general public through the advancement of science. Its goal is to further the understanding of scientific issues relating to nutrition, food safety, toxicology, risk assessment, and the environment by bringing together scientists from academia, government, and industry.

- **International Risk Governance Council (IRGC)**

IRGC (http://www.irgc.org) intends to identify and monitor scientific and technical progress in the interdisciplinary field of nanotechnology, catalogue the potential risks and benefits involved as well as the public's perception of them, and compile and assess the development of related regulatory regimes. IRGC will also assess nanotechnology's global impact, whether for good or bad, particularly its effect on the inequities between developed and developing economies. The IRGC intends to develop and publish guidance for governments, companies and research institutions on how to identify, structure, assess, avoid and control the risks associated with nanotechnology as well as how to balance the risks against the new technology's benefits.

Based in Switzerland, the International Risk Governance Council (IRGC) is an independent foundation that involves a public-private partnership which supports various sectors such as governments, business and other organizations in developing and developed countries.

- **Long Range Research Initiative**

LRI (http://www.uslri.com/) is an international industry funded program that gathers data on human exposure to chemicals, and has recently formed a sub-committee to study "health and science" issues related to nanomaterials.

The LRI is sponsored through the American Chemistry Council (ACC), which sponsors research that is aligned with health and environmental issues of highest priority to society and the chemical industry. The ultimate goal of the Long-Range Research Initiative (LRI) is to increase the knowledge of the potential impact that chemicals may have on human and wildlife populations and the environment.

- **Nanosafe and Nanosafe2**

Nanosafe2 (http://www.nanosafe.org) is a collaborative effort between 23 public and private organizations from seven countries to promote the responsible approach to identifying, monitoring and minimizing any risks presented by the exploitation of nanotechnology. The overall aim of Nanosafe2 is to develop risk assessment and management for secure industrial production of nanoparticles.

Nanosafe2 is funded by the European Commission through the Sixth Framework Programme (FP6). Nanosafe2 follows up on the first study, Nanosafe, supported by the EC's 5th framework program.

- **OECD Joint Meeting of the Chemicals Committee and Working Party on Chemicals, Pesticides and Biotechnology**

  The Organisation for Economic Co-operation and Development (OECD) is identifying human health and environmental safety issues associated with manufactured nano-materials that the Joint Meeting should address in the future.

  OECD's work on Chemical Safety is carried out under the Environment, Health and Safety (EHS) Programme and its secretariat is the EHS Division in the Environment Directorate. The Programme is overseen by the "Joint Meeting" which comprises the Environment Policy Committee's Working Party on Chemicals, Pesticides and Biotechnology and the Chemicals Committee.

- **Project on Emerging Nanotechnologies -**
  http://wwics.si.edu/index.cfm?fuseaction=news.item&news_id=120312

  This is a two-year, $3 million project by the Pew Charitable Trusts and the Woodrow Wilson International Center for Scholars to help businesses, governments, and the public anticipate and manage possible health and environmental implications.

  Societal Implications

- **International Nanotechnology in Society Network (INSN)**

  The INSN (http://www.nanoandsociety.org) was founded in January 2005 and consists of researchers exploring the connections between society and the possible upcoming changes provided by nanotechnology research. The members represent 15 institutions from 7 countries.

  The INSN will operate within six metathemes of research agendas and collaborations. These include:

  1. Engagement with Nanoscientists and Engineers/Design of Research Environments
  2. Social Management of Technological Change
  3. Political Economy of Nanotechnology
  4. S & T Dynamics (interdisciplinary)
  5. Frames and Claims
  6. Learning (a. reflexive social science; b. education and curriculum; and c. social learning)

  The INSN will be administered by a three groups: Consortium for Science, Policy, and Outcomes at Arizona State University; NanoNed at the University of Twente in the Netherlands; and Institute for Environment, Philosophy and Public Policy at Lancaster University.

Standards

- **American National Standards Institute**

  ANSI has formed a Nanotechnology Standards Panel (http://www.ansi.org/standards_activities/standards_boards_panels/nsp/overview.aspx?menuid=3), which will serve as the coordinating body for the development of standards in the area of nanotechnology. The American National Standards Institute's Nanotechnology Standards Panel (ANSI-NSP) serves as the cross-sector coordinating body for the purposes of developing

standards in the area of nanotechnology including, but not limited to, nomenclature/terminology; materials properties; and testing, measurement and characterization procedures.

- **ASTM International**

  The ASTM International Committee E56 on Nanotechnology (http://www.astm.org/cgi-bin/SoftCart.exe/COMMIT/COMMITTEE/E56.htm?L+mystore+gxyx8351+1115426305) addresses issues related to standards and guidance materials for nanotechnology and nanomaterials. The committee will develop standards and guidance for nanotechnology and nanomaterials. It will also coordinate the existing ASTM standards related to nanotechnology needs. The committee will participate in the development of symposia, workshops and other related activities to enhance the development of standards.

  ASTM, originally known as the American Society for Testing and Materials, is a not-for-profit corporation organized in 1898. ASTM is a management system for the development of standards and related technical information for materials, products, systems, and services. It provides a legal, administrative, and publications forum within which producers, users, ultimate consumers, and representatives of government and academia can meet on a common ground to develop standards that best meet the needs of all concerned.

- **The British Standards Institution**

  BSI (http://www.bsi-global.com/index.xalter) is developing a vocabulary for nanomaterials that will be published in May 2005.

  The BSI Group provides services to businesses worldwide, including: independent certification of management systems and products; commodity inspection services; product testing services; the development of private, national and international standards; management systems training; and information on standards and international trade.

- **CEN, the European Committee for Standardization**

  In March 2004, the CEN Technical Board (BT) created CEN/BTWG 166 'Nanotechnology' (http://www.cenorm.be). The Working Group reports to the CEN/BT and its secretariat is with the BSI (British Standards Institution). Its major task is to analyze the need for standardization activities in this new area and to initiate relevant activities. The first step is the drafting of a Business Plan for a new CEN/TC.

  CEN was founded in 1961 by the national standards bodies in the European Economic Community and EFTA countries. CEN contributes to the objectives of the European Union and European Economic Area with voluntary technical standards which promote free trade, the safety of workers and consumers, interoperability of networks, environmental protection, exploitation of research and development programs, and public procurement.

- **People's Republic of China, Ministry of Science and Technology**

  China is developing national standards for nanomaterials, including a nanomaterial nomenclature. China's first package of nanostandards is made up of a nomenclature, two testing methods, and four sets of specifications for nanoproducts that came into effect on April 1, 2005. In addition to these seven standards, China will continue to work out other related standards in a move to establish a well-functioned standard system for the nanotechnology industry.

Public Engagement

- **Demos NanoDialogues**

  Demos is working with two UK research councils, the UK environment agency, a corporate partner and a not-for-profit to explore how social intelligence can inform decision-making in nanotechnology funding and diffusion (http://www.demos.co.uk/projects/currentprojects/nanodialogues/). The project includes four experiments in public engagement and is funded by The Office of Science and Technology's Sciencewise project, created to foster interaction between scientists, government and the public on impacts of science and technology.

  Experiment 4 is called "Globalisation and nano diffusion" (partner: ITDG) and focuses on the following key questions: How can debates about nanotechnologies be extended to include publics in developing countries? What are the potential impacts and concerns from the perspective of communities in Kenya and Sri Lanka?

- **NanoJury UK**

  A 20 member the citizens' jury will hear evidence from a range of experts about future potential applications, risks and benefits of nanotechnology. The witnesses will be chosen by a panel of experts who will oversee the jury's activities, and a science advisory panel. Both comprise a mix of academic, industry, government, and not-for-profit, representatives. The jury will discuss the pros and cons, and agree on a "verdict". Their thoughts will then be fed back into the UK government's Nanotechnology Co-ordination Group.

  NanoJury UK (http://www.nanojury.org/) has been set up by the IRC (Interdisciplinary Research Centre) in Nanotechnology, University of Cambridge, Greenpeace UK, the Guardian, and the Policy, Ethics and Life Sciences Research Centre of the University of Newcastle.

- **Nanologue**

  Nanologue (http://www.nanologue.net) is a European Commissioned-funded project that brings together leading researchers from across Europe to facilitate an international dialogue on the social, ethical and legal benefits and potential impacts of nanoscience and nanotechnologies.

  Nanologue's overarching objective is to facilitate dialogue between research, business and civil society on the ethical, social and legal aspects of Nanotechnology and about the potential of nanoscience and nanotechnology applications to improve the quality of life and create wealth. The dialogue will be facilitated amongst others by means of interviews and workshops.