

Report

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Global Nanotechnology Advocacy by NGOs

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The Programme on NGOs and Civil Society

Worldwide, the role of civil society has been increasing at rapid speed. Non-governmental organizations (NGOs) have become significant and influential players and generate much interest. Created in 1986, the Programme on Non-Governmental Organizations and Civil Society aims at contributing towards a better understanding of NGOs and the solutions of complex and conflictive societal problems involving NGOs.

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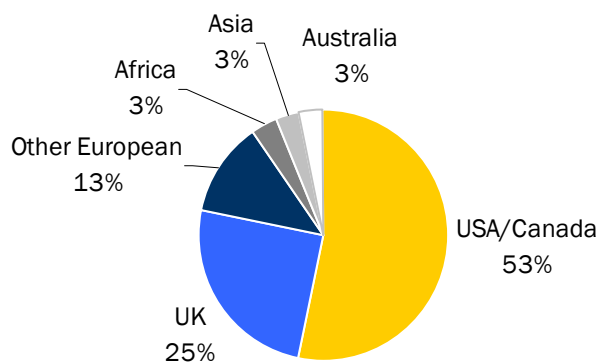
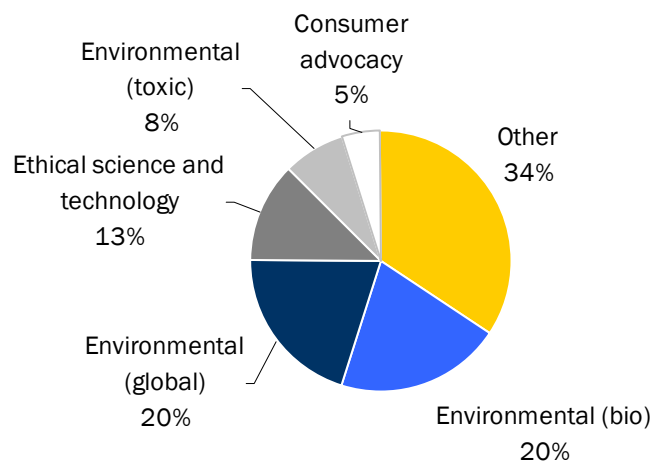
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EXECUTIVE SUMMARY

This study demonstrates that the nanotechnology advocacy world is vast and differentiated. Nevertheless, grouping organizations and their demands can reveal some interesting trends:

- Two types of environmental organizations (bio, i.e. those propagating organic agriculture and opposing genetic modification; and global, i.e. those advocating on a broad range of environmental issues) are the most strongly represented groups, but “other” organizations are also very numerous.
- Nanotechnology advocacy is most developed in North America and the United Kingdom, with continental Europe lagging a bit.
- The main concerns revolve around the concentration of power as a result of intellectual property regimes, the misuse of nanotechnology for destructive purposes, the disruption of existing economic systems, ethical issues related to human improvement and privacy, and negative impacts on human health and the environment.
- Impacts on human health and the environment are the number one concerns. British organizations tend to be more worried than their North American counterparts about the concentration of power nanotechnology may bring about. In fact, there are more similarities than differences between groups in the different countries, pointing to a consensus among campaigning organizations on the problems with nanotechnology.
- NGOs most commonly propagate the following solutions to the above problems: regulation of the production and distribution of goods containing nanoparticles; improved intellectual property regimes; a moratorium on the production and distribution of products containing nanoparticles; labeling of nanotechnology products; increased research into the safety and ethical aspects of nanotechnology; and an inclusive public dialogue on the technology.
- Regulation is the most commonly put forward demand, followed by a moratorium on the distribution of nanoparticles and a public dialogue on the technology.



INTRODUCTION

The NGO movement surrounding nanotechnology is gaining steam. Far from being a homogeneous group, the NGOs involved in nanotechnology advocacy represent a relatively broad variety of actors, with a corresponding wide array of characteristics and demands.

This report provides an overview of the most important actors on the scene. In order to facilitate analysis and make comparisons, the paper makes a number of generalizations. First, NGOs are examined for their primary areas of activity; their concerns with nanotechnology are scrutinized next, and an analysis of their demands forms the last part of the study. In fact, these generalizations obscure the heterogeneity of the nanotechnology advocacy world. It is important to keep this in mind when reading the analysis, and to refer to Tables 1 and 2 in order to appreciate more fully the diversity of opinions and demands in the nanotechnology-related NGO world.

TPOLOGY OF NGOS

The results compiled for this paper (see Table 1 and Table 2) are the output of a web-based search for NGOs involved in nanotechnology advocacy. The search was carried out in English, French and German. While the 64 organizations surveyed do not constitute the entirety of NGOs active in nanotechnology, the study does contain the most active ones, and the total number is sufficiently large to allow some generalizations to be made.

In order to aid analysis, organizations were classified into several groups:

- First, organizations listed in Table 1 have been labeled “principal”, as their focus on nanotechnology is sufficient for them to publish material on the web or even develop their own policy on the issue. The “secondary” organizations, listed in Table 2, have typically supported the “Principal” organizations’ causes by co-signing appeals or co-organizing events, but have not published their own analysis of nanotechnology.
- Second, all organizations were loosely grouped into functional areas in order to permit an analysis of the types of NGOs interested in nanotechnology. The categories employed are as follows:
 - Consumer advocacy: NGOs that primarily focus on consumer protection.
 - Environmental (bio): NGOs primarily dealing with genetic engineering and organic farming.
 - Environmental (global): NGOs advocating on a number of environmental issues without a particular focus.

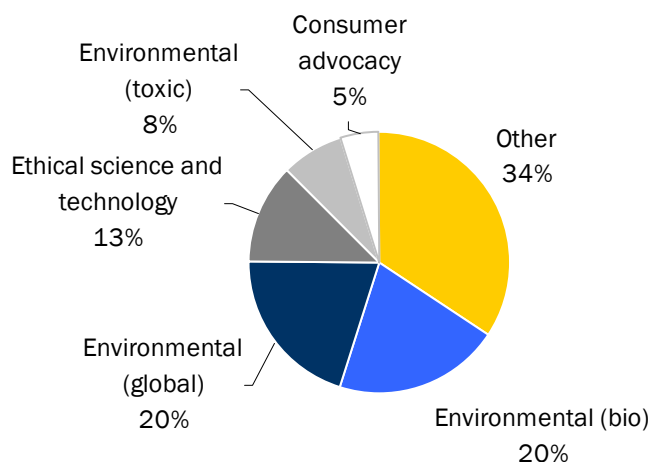
- Environmental (toxic): NGOs primarily dealing with pollutants.¹
- Ethical science and technology: NGOs primarily concerned with the sound application of technology and science.
- Other: This basket contains NGOs that run the gamut from anti-corporate to human rights groups, development agencies to public health organizations, trade unions to think tanks. Their individual foci are listed in Tables 1 and 2.

It has to be stressed that both the division into “principal” and “secondary” organizations, as well as into the above functional areas are ideal-types, and that this is only done in order to allow some generalizations to be made. The boundaries between the categories are somewhat fluid, and the groupings are thus not to be understood as authoritative.

- Third, the NGOs were classified by country to identify the main loci of nanotechnology activism.

These classifications allow a number of conclusions to be made. The division into “principal” and “secondary” organizations underscores the division of labor that modern civil society networks develop in order to increase their effectiveness. Some organizations act as the mouthpiece, whereas others, with related aims, bandwagon in order to increase the representativeness and credibility of the main pressure groups. The many informal alliances developed across these categories and across countries highlight the importance of networking, although the most close-knit networks do seem to have developed within countries, in particular in the USA.

Figure 1: NGOs by Type



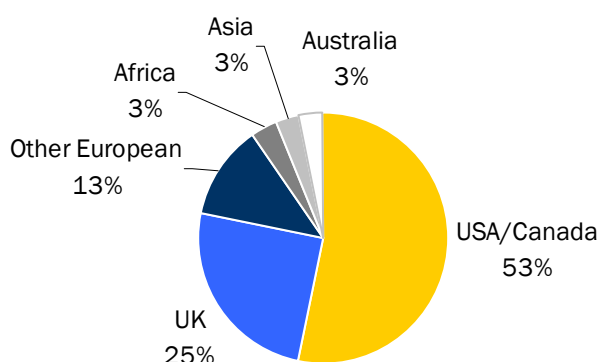
The classification into functional groups shows the diversity of actors who have mobilized around nanotechnology (see Figure 1). The majority of organizations are environmental groups, and here, those that deal primarily with genetic modifications and organic farming (bio) form the largest group (20%), alongside those who advocate on a range of

¹ The environmental categories are taken from: Robert Ackland et al. *New Methods for Studying Online Environmental-Activist Networks*. Paper presented to 26th International Sunbelt Social Network Conference, Vancouver. April 24, 2006.

environmental topics (global, 20%). Both have been able to build strong constituencies over time. Environmental NGOs that concentrate on toxicology issues form a slightly less significant group (8%), but are still relatively strongly represented considering their lower absolute numbers. The strong representation of organizations dealing with the ethical application of science and technology (13%) is also noteworthy. While this classification does highlight the main types of NGOs interested in nanotechnology, it obfuscates the basket of “other” organizations, who form the largest group at 34%. This group is made up of all those who defy categorization or who are by themselves not numerous enough to warrant a category of their own. Their composition is explained above, and details are available in Table 1 and Table 2. The main result of this categorization is that, although environmental groups dominate overall, a large range of other actors is attracted to the topic, and thus the interests represented are very diverse.

Grouping organizations by country or region reveals a strong representation of nanotechnology advocacy groups in the United States and Canada (53% of all NGOs surveyed) and the United Kingdom (25%, see Figure 2). Continental Europe is less strongly represented (13%), and organizations there are scattered across numerous countries (Belgium, France, Germany, Sweden, Switzerland). Africa, Asia and Australia are represented only on the margins (3% each).

Figure 2: NGOs by Country / Region



This geographical skewing towards developed countries partly reflects technological advances, and in part the advanced state of civil society in developed democracies. The disproportionate number of organizations active in nanotechnology in North America comes as a bit of a surprise, as environmental (bio) organizations tend to be more influential in Europe, where they have scored successes in the GMO debate. One might thus have expected a stronger representation from the old world. It is possible, however, that the language bias of this study has underrepresented the numbers of NGOs from continental Europe.

NGOS' CONCERNS

The evidence gathered for this paper is based on information available on websites of NGOs, as well as on related websites and in the media. It is possible that the organizations' concerns are not limited to the ones listed here. Similarly to the methodology utilized above to group organizations, the concerns of the NGOs surveyed have been clustered into several overarching categories to facilitate analysis. Their components will be detailed and explained in this section.

The most general problems in the eyes of the campaigning organizations – a viewpoint to which virtually all organizations surveyed subscribe – are the dearth of research into safety issues of nanotechnology, the scarcity of funding for such research, and the lack of regulation of products containing nanotechnology. More specific concerns can be grouped into the following categories:

Concentration of Power

Several groups are concerned that the development of nanotechnology, in particular the patenting of materials, will concentrate power in the hands of very few Northern industrial and military organizations. As a result of broad intellectual property and patent laws, patents can be granted for engineered compounds between elements of the periodic table, enabling a ground-breaking patent holder to control large parts of industrial production, according to the ETC Group. This would exacerbate existing social and economic inequalities, as the availability of high-tech clusters, venture capital, government research funding and infrastructure invariably skews the balance towards developed countries. Some organizations therefore already speak of a “nano-divide” between the developed and the developing world, similar to the digital divide. Friends of the Earth (FoE) USA also points out that all products on the market so far have been aimed at rich consumers in the global North. Some also foresee new mergers across formerly separate sectors due to technological convergence in the fields of IT, biotech, atomic manipulation, artificial intelligence and nanotechnology, creating ever larger and more powerful corporations with greater economic and political influence. There is a resulting apprehension about economic oppression due to artificially inflated prices. FoE UK poses the question of which government bodies would have the capacity to regulate this area.

Destructive Uses

Fears similar to those concerning the increasing power of corporations surround militaries. In addition, there is concern that nanotechnology will be used for destructive purposes such as wars and terrorism, with strong implications for renewed arms races and world security. There also is concern around the prospects for effective monitoring of nanotechnology in the military arena.

Disruption of Economic Systems

Linked to the abovementioned concentration of power is the fear that nanotechnology will disrupt existing economic systems and structures. The potential of nanotechnology to replace raw materials such as copper, cotton or rubber jeopardizes the export base of numerous developing countries. Many NGOs fear that vulnerable groups, particularly in poor countries, will suffer disproportionately from disruptions to trade patterns and resulting job losses. Some predict social upheaval as a result of the interchangeability of geography, raw materials and labor imposed by nanotechnology. Moreover, there are concerns that cheap manufacturing and the duplication of designs could lead to economic upheaval. One of the most influential critics of nanotechnology, Pat Mooney of the ETC Group, warns of future technology rather than trade wars.

Environmental Impact

One of the most prolific topics in the debate surrounding nanotechnology is the potential impact on the environment. The release of nanoparticles through household or manufacturing waste as well as accidental release is of major concern to many actors on the scene. Among numerous others, FoE Australia has highlighted that nanotechnology's effects on plants and animals are largely unknown. Research cited in many reports points to evidence of carbon fullerenes causing brain damage in largemouth bass, killing water fleas and having bactericidal properties. Moreover, there are substantiated claims about bioaccumulation and effects on nitrogen-fixing microbes, both of which could endanger entire ecosystems.

Ethics

Numerous actors see ethical problems in the manipulation of the building blocks of life that nanotechnology enables. In this context, FoE USA points out as problematic the convergence of nano- and biotechnology and its quest to create organisms containing both manufactured and biological components. Similarly, the ETC Group's "little BANG" theory describes the convergence of bits (information technology), atoms (nanotechnology), neurons (cognitive neuroscience) and genes (biotechnology) at the nano scale, with a potential to improve human performance by, for example, having neurons communicate with small computers or engineering viruses to act as machines. Attempts at human enhancement have drawn strong criticism from disability and human rights advocates, who worry that they will create new inequalities and further marginalize disadvantaged groups. Greenpeace UK adds its unease about the prospect of the de-selection of characteristics taken to be unwanted by society being seen as the right and moral choice. The NGO also raises the question of whether such enhancements can be forced upon people. The Electronic Privacy Information Center adds that such potential genetic positive or negative discrimination could have an effect on employment, health insurance eligibility, and the pressure to become genetically perfect. There is a general fear that humanity might be redefined.

Privacy International also worries about the effect that increased computing capabilities as a result of nanotechnology can have on the development of smaller and more efficient collection, storage, sharing and processing of large amounts of information. Moreover, several organizations have pointed out the risk of increasing surveillance and weapons systems, and the increased incentives for private companies to produce and purchase security nanotechnology. Ethical and privacy concerns also are at the heart of the fear surrounding nanotechnology's contribution to producing microchips that could be implanted into humans as a means of controlling or monitoring imprisoned people or those on parole, people receiving public assistance, children or employees.

Given the skepticism on the part of many NGOs of nanotechnology's potential to contribute to poverty reduction and environmental improvements, some, such as FoE UK, also question whether public funds should be spent on nanotechnology research, or whether they wouldn't be better spent on promoting social justice and environmental sustainability.

Human Impact

The most widespread criticism of nanotechnology stems from the unknown – or partially proven – adverse effects on human health. There are three main concerns surrounding the danger of nanoparticles to humans. First, there is concern that inhalation of such particles may damage the lungs, similar to the way ultra fine particles from burning fuels do. The worry here is that nanoparticles themselves can be damaging, as well as that they may act as carriers of other toxic chemicals such as metals or hydrocarbons. Second, there are fears that nanoparticles can enter the body through the skin, the lungs and the digestive system, creating “free radicals” that can damage cells. There also is concern that nanoparticles that have entered the bloodstream can enter the brain. These fears are exacerbated by the fact that, while the body has developed tolerances to most natural elements and molecules it comes into contact with, it has no such immunity to new substances. This may heighten the toxic effects of nanoparticles. The small size of nanoparticles further implies that they are more reactive, again increasing the possible toxicity of such elements.

Several studies undertaken to date provide the basis for these fears. Their results include that carbon nanotubes can cause lung inflammation and fibrosis; that carbon nanotubes can damage skin cells; that nano-sized carbon can be transported into the brain after inhalation by mammals; that Buckyballs can be transported across gills into the brains of fish and damage brain tissue; and that quantum dots injected into skin can be transported to lymph nodes, with possible effects on the immune system.

These health hazards have raised questions about the rights of workers who might be exposed to nanoparticles in the production of goods containing such elements, and have led to demands for their protection. Similarly, the appearance of nanoparticles in consumer products has caused consumer protection and other groups to call for

moratoria and increased safety research before such products are released in order to safeguard the health of consumers.

Over-Consumption

A comparatively rare concern is that nanotechnology could lead to the inexpensive production of certain products, thus causing widespread environmental damage due to overproduction and consumption.

Regulatory Issues

Virtually all NGOs involved in advocacy on nanotechnology raise substantial fears about the regulatory vacuum surrounding the technology. Since all NGOs do, this has not been counted as a separate category in the survey. There are, however, some nuances that deserve special mention.

A few bodies worry that attempts to control the abovementioned risks may bring about abusive restrictions, or create black markets, with the resulting risk of diffusion through uncontrolled channels. Furthermore, organizations such as FoE UK point out the lack of safety measures in laboratories or elsewhere, as well as liabilities arising from the use of nanotechnology in the event that they may prove harmful. Other regulatory issues will be discussed in the section on solutions proposed by NGOs to the quandaries the emergence of nanotechnology poses.

CONNECTING ORGANIZATIONS AND THEIR CONCERNS

Based on the analysis of the 29 “primary” organizations, Figure 3 shows that the impact of nanotechnology on humans is by far the most wide-spread concern of campaigning NGOs, followed by its environmental impact. Ethics, the disruption of economic systems, destructive uses of nanotechnology and the concentration of power follow with equal weight in third place.

Figure 3: Global Concerns

(multiple mentions possible)

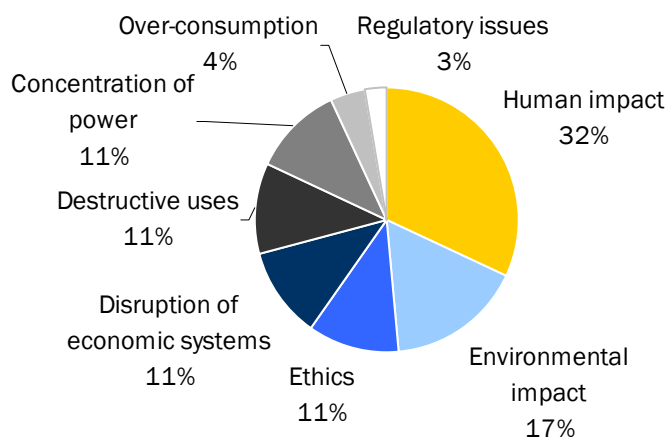


Figure 4: Concerns of US/Canadian Organizations
(multiple mentions possible)

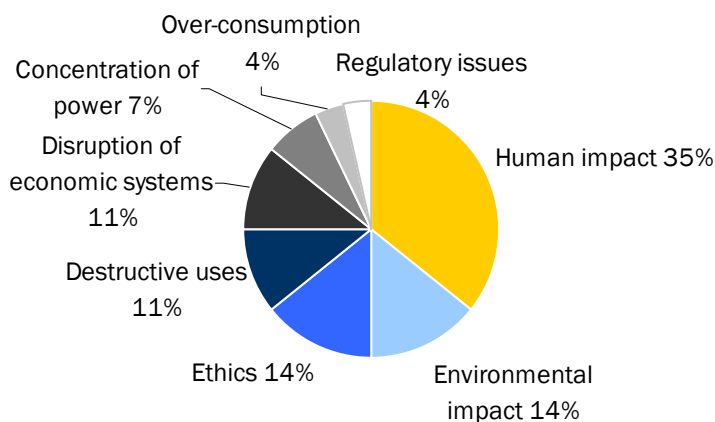
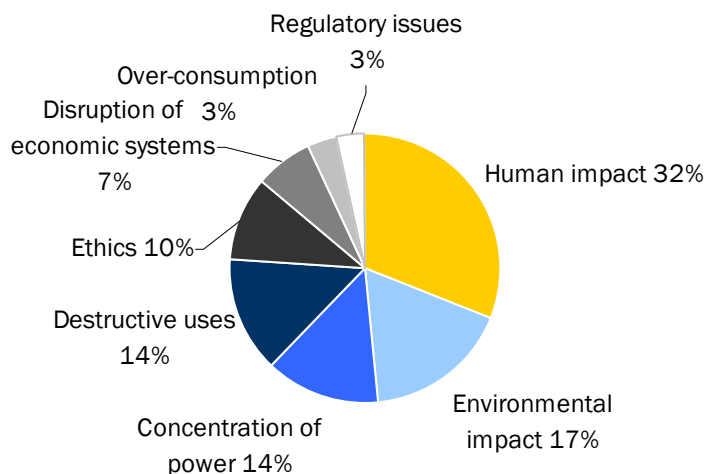


Figure 5: Concerns of UK Organizations
(multiple mentions possible)



It is interesting to note that, in the US and the UK, the main loci of nanotechnology activism, the priority concerns are very similar (see Figure 4 and Figure 5). This speaks to the global consensus among NGOs, based on in-depth exchanges of information and the dominant position in the discourse formation of organizations such as the ETC Group, Friends of the Earth and Greenpeace, whose arguments are picked up by many other actors. One notable difference, however, is the importance of the concentration of power to UK-based organizations, which suggests that corporations are viewed with more skepticism and that social justice issues play a bigger role in the UK debates than in North America.

Figures 6 to 9 disaggregate the abovementioned concerns into the main types of NGOs conducting nanotechnology activism. Several aspects can be highlighted here. First, the largest single group of NGOs, environmental (bio), limits its message to only three topics: human and environmental impacts and the concentration of power. It is also by far the most likely to cite concerns about human impact, a stance that is unsurprising as these organizations tend to be driven by concern about the effects of modified organisms on the human body (see Figure 6).

Figure 6: Concerns of Environmental (bio) Organizations

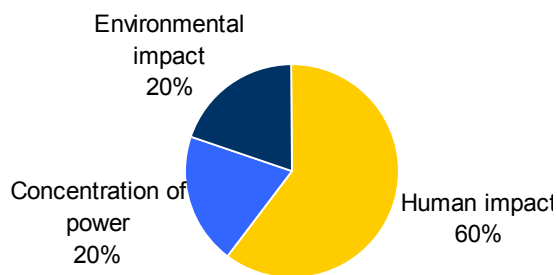


Figure 7: Concerns of Environmental (global) Organizations

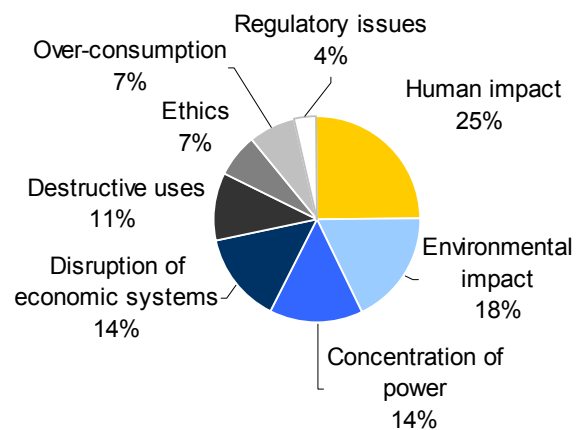


Figure 8: Concerns of Ethical Science & Technology Organizations

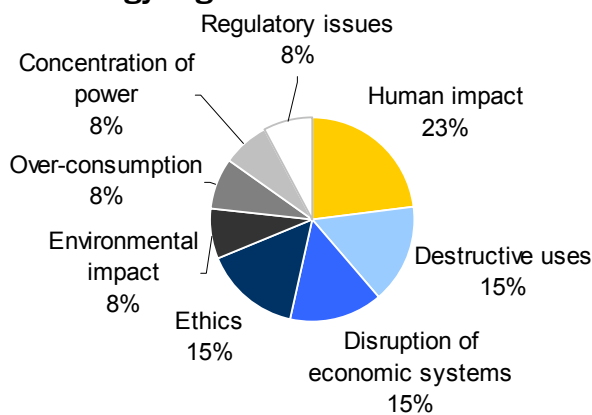
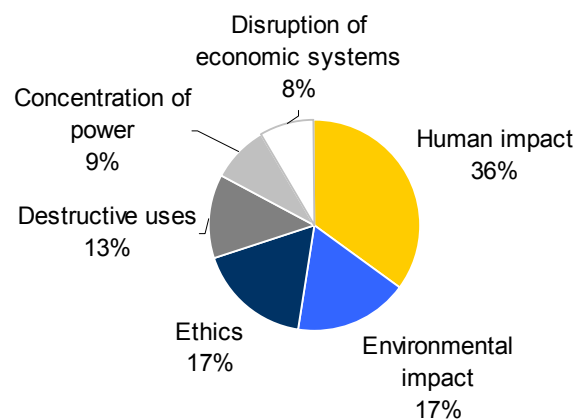


Figure 9: Concerns of Other Organizations



Environmental (global) organizations, somewhat surprisingly, don't mention environmental impact most often as a concern, but human impact instead. Relatively speaking, however, they are the strongest promoters of environmental concerns. Together with environmental (bio) organizations, they also most often cite concentration of power as a concern (see Figure 7). More expectedly, organizations focusing on ethical science and technology mention potentially destructive uses and the disruption of

economic systems most frequently. Among the homogeneous groups (i.e. excluding “other” organizations), they are also the most prominent critics of ethical issues, however this is only their second most often cited concern. They also are least likely to mention environmental effects as a problem (see Figure 8). All types of NGOs, however, are most likely to cite human impact as a concern.

NGOS’ SUGGESTIONS

To constructively engage NGOs, it is important to be aware of the solutions they propagate to the quandaries nanotechnology poses. As in the case of the NGOs and their concerns, their demands have been grouped into several categories to facilitate analysis. For a more detailed landscape of their varied suggestions, please refer to Table 1.

Regulation

Two thirds of organizations explicitly demand some kind of regulation on nanotechnology. Such regulation can be related to laboratory procedures, products containing nanoparticles, consumer and worker protection, privacy, the environment, or definitions and the standardization of the technology.

Labeling

Related to regulatory issues, several organizations are requesting that goods containing nanoparticles be clearly identified by labels and data sheets in order to allow consumers to be adequately informed.

Moratorium

Numerous NGOs go even further, calling for a moratorium on the sale of products containing nanomaterials, arguing that the research to date is insufficient to guarantee the safety of a product, and that whatever safety research has been conducted has not been sufficiently transparent. The ETC Group is additionally asking for a moratorium not only on the sale of nanoproducts, but also on nano-research until laboratory protocols have been elaborated and proven safe.

Research

Most calls for additional research into nanotechnology concern safety research, which most NGOs consider inadequate to date. Fewer organizations are calling for increased research into the social effects of nanotechnology. Many combine the call for more research into both aspects with calls for increased funding for the research.

Testing

In connection with increased research, several organizations also want to see more testing of products that are intended for the market place.

Public Dialogue

In order to study and discuss the effects of nanotechnology in all realms, many NGOs are calling for an inclusive public dialogue. Importantly, they want this dialogue to comprise civil society organizations, and also the marginalized.

Precautionary Principle

In the absence of many of the above demands, several organizations are demanding the application of the precautionary principle so as to avoid the potential for harm until more research is available on the matter.

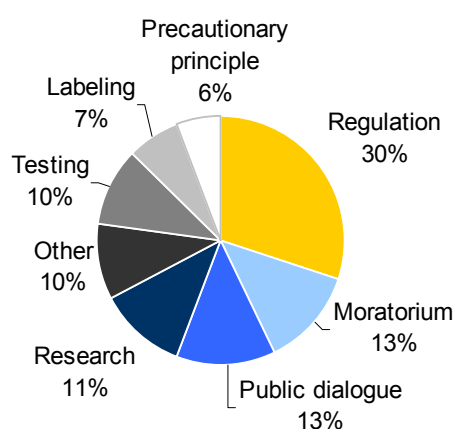
Others

Other suggestions include increased international cooperation in the development and regulation of nanotechnology; the regulation of new technologies by a United Nations body; a reform of the intellectual property regime governing nanotechnology; and the development of equipment to detect nanoparticles.

CONNECTING ORGANIZATIONS AND THEIR SUGGESTIONS

A large majority of suggestions concerns regulation. Even when eliminating double-counting of regulatory calls by one organization (e.g. for lab standards and consumer products), one in three NGOs calls of the 24 “primary” organizations sampled concerns regulation, and two thirds of those NGOs make such a demand. Calls for moratoria, public dialogue and increased research follow. The precautionary principle is cited least often, however an argument could be made to connect it to a call for a moratorium, in which case this combination would clearly constitute the second-most often cited request (see Figure 10).

Figure 10: NGOs' Suggestions



It is also interesting to note that, in contrast to the NGOs' concerns, there is a noticeable difference between the demands of UK- and American/Canadian-based organizations (see Figure 11 and Figure 12 on the next page). In both places, pressure groups are

most likely to call for regulation and a moratorium as the single-most prominent issues. The contrasts that stand out, however, include the relatively higher percentage of calls for a moratorium and public dialogue in the UK; the absence of calls for the application of the precautionary principle in North America; and the absence of “other” suggestions in the UK, which may point to a more “homogeneous” advocacy line having been developed in the UK, or which may be due to the broader range of actors being involved in campaigning in the US.

Figure 11: Suggestions of UK Organizations

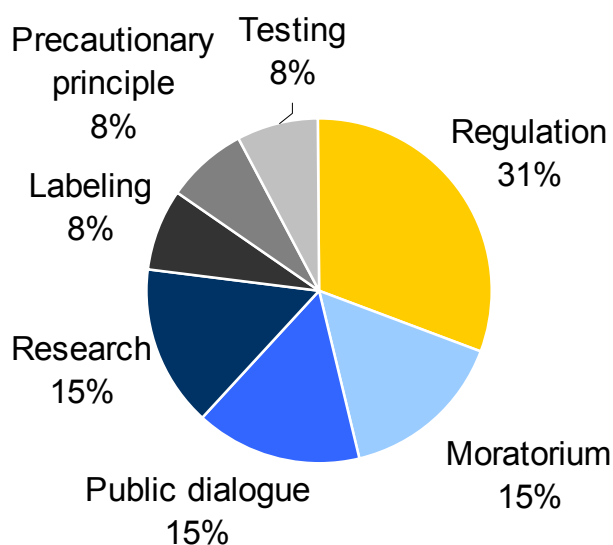
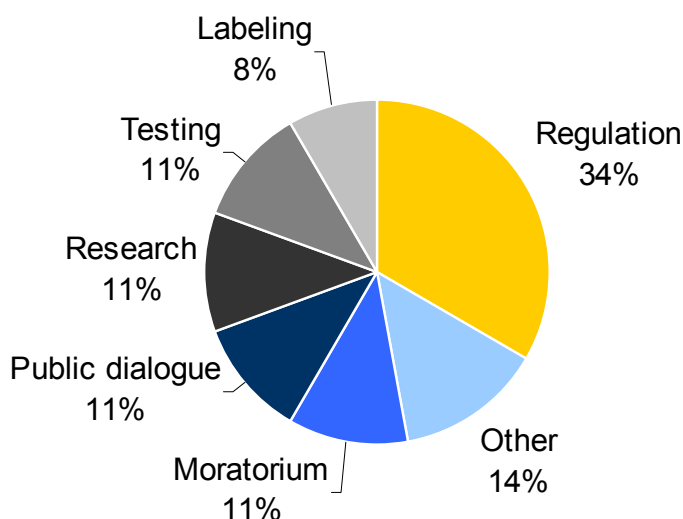


Figure 12: Suggestions of US / Canadian Organizations



Figures 13 to 16 disaggregate the above data for those organizations that articulate the most suggestions: consumer advocacy groups, environmental (bio) and (global) organizations, and ethical science and technology bodies. The difference in demands between these groups stands out very clearly. While the statistical validity of the data is limited, some trends can be identified from this disaggregated analysis.

As is to be expected from the macro view gained above, regulation features heavily among the demands of all groups. The most common demand from consumer groups is an open public dialogue on nanotechnology, followed by calls for regulation and increased testing. Interestingly, a moratorium doesn't figure in these demands (Figure 13). Calls from environmental (bio) groups most often concern a moratorium, followed by regulation and labeling (Figure 14) – in effect, putting the most precautionary option first, and moving downwards in levels of consumer protection, creating a logical flow of events to protect humans. Environmental (global) NGOs are most likely to demand regulation, public dialogue and increased research on nanotechnology (Figure 15). Groups promoting ethical science and technology cite regulation and a moratorium most often, however they also put forth a variety of other suggestions (Figure 16).

Figure 13: Suggestions of Consumer Advocacy Organizations

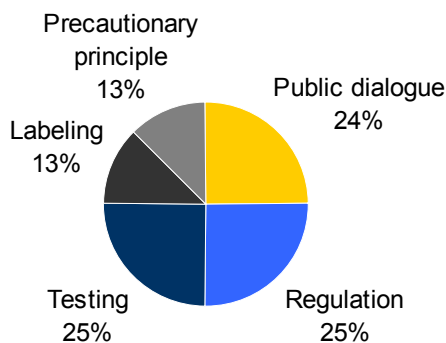


Figure 14: Suggestions of Environmental (bio) Organizations

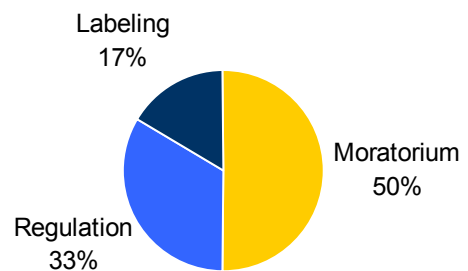


Figure 15: Suggestions of Environmental (global) Organizations

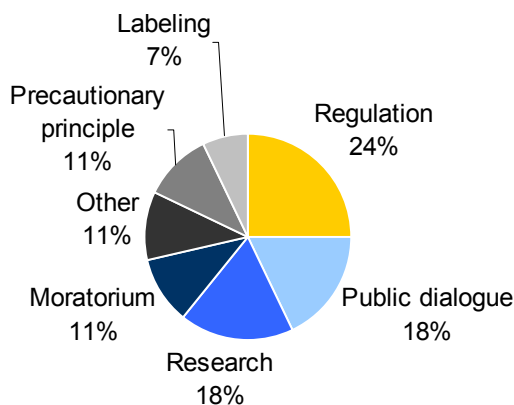
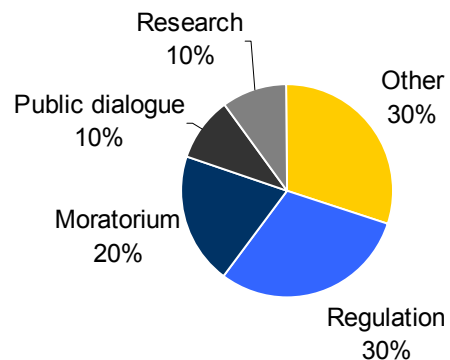


Figure 16: Suggestions of Ethical Science & Technology Organizations



CONCLUSION

As this study has shown, the nanotechnology advocacy world is vast and very differentiated. Nevertheless, grouping organizations and their demands can reveal some interesting trends. Environmental (bio) and (global) organizations are the most prominently represented groups, but “other” organizations are also very numerous. Nanotechnology advocacy is most developed in North America and the United Kingdom, with continental Europe lagging. British organizations tend to be more worried about the concentration of power nanotechnology may bring about, but NGOs from both places clearly cite potential damage to humans and the environment as their most prominent concerns. Regulation is the most commonly put forward demand, followed by a moratorium on the distribution of nanoparticles and a public dialogue on the technology.

Table 1: Principal Organizations Involved in Nanotechnology Advocacy

Organization	Type	Country	Concerns	Suggestions
Bund für Umwelt und Naturschutz Deutschland (BUND/Friends of the Earth Germany)	Environmental (global)	Germany	Environmental impact Human impact	Transparent safety testing Regulatory oversight Peer-reviewed studies Assess nanomaterials as new substances Public dialogue on nanotechnology Precautionary principle Moratorium on sale of products containing nanoparticles
Center for Environmental Health	Environmental (toxic)	USA	Human impact	Regulatory safeguards to protect workers, communities, and the environment
Center for Food Safety	Environmental (bio)	USA	Human impact	Regulation Labeling Moratorium
Center for Responsible Nanotechnology	Ethical science and technology	USA	Destructive uses Disruption of economic systems Environmental impact Over-consumption Regulatory issues	Built-in technical restrictions in personal nanofactories Intellectual property reform International cooperation in development and monitoring
Consumers Union	Consumer advocacy	USA	Environmental impact Human impact	Public disclosure and transparency Pre-market safety assessments Labeling Regulation
Corporate Watch	Other (anti-corporate)	United Kingdom	Concentration of power Disruption of economic systems Human impact	Regulation
Demos	Other (public policy think tank)	United Kingdom	Human impact	Public dialogue
Electronic Privacy Information Center (EPIC)	Other (privacy advocacy)	USA	Environmental impact Ethics Human impact	Enact legislation in advance of the adoption of nanotechnology innovations to consider environment, health, safety, public welfare, and privacy Dedicate more resources to researching social implications of NT

Environmental Defense	Environmental (global)	USA	Environmental impact Human impact	Increase risk research Improve regulatory policy so as to include new materials such as those involving NT Establish corporate standards of care Engage a diverse range of stakeholders
ETC Group	Ethical science and technology	Canada	Concentration of power Disruption of economic systems Ethics Human impact	Society to engage in a wide debate about social, ethical and intellectual property issues. The disability rights movement must be a key participant in the debate. Moratorium on nanotech research and new commercial products until laboratory protocols and regulatory regimes are in place Moratorium on sales of products containing NT Moratorium on lab experimentation with and release of synthetic biology materials Create a new United Nations body and an International Convention on the Evaluation of New Technologies (ICENT) with the mandate to track, evaluate and accept or reject new technologies and their products Regulation
European Consumers' Organisation	Consumer advocacy	Belgium		Precautionary principle Pre-market assessments Engage the public Develop legislative framework
Foresight Institute	Other (public education)	USA	Destructive uses Ethics	Conduct safety research
Forum for the Future	Other (sustainable development)	United Kingdom	Environmental impact Human impact	

Friends of the Earth Australia	Environmental (global)	Australia	Concentration of power Disruption of economic systems Over-consumption Human impact	Community and environmental interests and values must always come first Individual / company interest must come second A precautionary approach to managing risk is essential, but not enough to address key community concerns New mechanisms that allow true civil society participation in decision-making Moratorium on commercial distribution of personal care products involving NT Conduct safety research and make results publicly available Regulatory framework to protect workers, general public and environment from exposure Apply precautionary principle Label goods containing nanoparticles
Friends of the Earth UK	Environmental (global)	United Kingdom	Concentration of power Destructive uses Environmental impact Ethics Human impact Regulatory issues	
Friends of the Earth USA	Environmental (global)	USA	Concentration of power Destructive uses Disruption of economic systems Human impact	Moratorium on commercial nano production Comprehensive regulatory regime
GeneEthics Network	Environmental (bio)	Australia	Human impact	Moratorium Regulation
Greenpeace UK	Environmental (global)	United Kingdom	Concentration of power Destructive uses Disruption of economic systems Environmental impact Ethics Human impact Over-consumption	Apply precautionary principle Public dialogue Regulation Safety research

Institute for Agriculture and Trade Policy	Other (agricultural policy)	USA	Human impact	<p>US Food and Drug Administration (FDA) to accelerate safety research on nanotechnologies</p> <p>Make approval of new nanotechnologies contingent on manufacturers providing public information that demonstrate their products to be safe to use.</p> <p>Develop equipment to detect nanomaterials in products and in the environment for product inspection</p> <p>Without such provisions, FDA should not continue to process applications for approval to commercialize products with nanomaterials</p>
International Center for Technology Assessment	Ethical science and technology	USA	Ethics Human impact	<p>Halt the commercialization of nanotechnology until products containing nanoparticles have been proven safe.</p> <p>Regulatory agencies to adopt an accurate and standardized definition of nanotechnology</p> <p>Regulate emerging nanotechnologies as other materials whose safety has not been determined.</p>
International Risk Governance Council	Other (risk governance)	Switzerland		Apply a comprehensive risk governance framework
Natural Resources Defense Council	Environmental (global)	USA	Human impact	<p>Promote pollution prevention, sustainable resource use, and good product stewardship</p> <p>Research human health and ecological impacts</p> <p>Identify risks and information gaps</p> <p>Increase collaboration on potential human and environmental health implications;</p> <p>Train government scientists and managers on potential environmental applications and implications</p> <p>Prevent uses that may result in human exposures or environmental releases, unless reasonable assurances of safety are demonstrated beforehand</p> <p>Require labels for products that contain nanomaterials and those made with processes that use nanomaterials</p> <p>Publicly disclose information on potential risks</p> <p>Include human impact information for worker protection on material safety data sheets</p> <p>Increase safety testing conducted by independent or government laboratories subject to "sunshine laws" that allow public access</p> <p>Conduct comprehensive assessment of environmental</p>

				and human health concerns that may arise across the life-cycle of nanotech products
Practical Action	Other (appropriate technology)	United Kingdom	Environmental impact Human impact	Robust regulation including mandatory reporting, safety assessment, emissions minimization, labeling and liability for new and existing nanomaterials Moratorium on the commercial and environmental release of further engineered nanomaterials
Privacy International	Other (human rights)	United Kingdom	Destructive uses Ethics	
Scientists for Global Responsibility	Ethical science and technology	United Kingdom	Destructive uses Human impact	Increase funding for risk studies
Soil Association	Environmental (bio)	United Kingdom	Concentration of power Environmental impact Human impact	Ban products or ingredients produced using nanotechnology
Trades Union Congress	Other (trade union umbrella organization)	United Kingdom	Human impact	Production and use of nanoparticles to take place within a contained process to avoid employee exposure Treat nanomaterials like any other serious health risk and apply regulations rigorously
World Conservation Union (IUCN) South Africa	Environmental (global)	South Africa	Disruption of economic systems Environmental impact	Compare with other technologies to inform regulation and policy
World Council of Churches	Other (religious umbrella organization)	Switzerland	Concentration of power Destructive uses Disruption of economic systems Environmental impact Ethics Human impact	

Table 2: Secondary Organizations Involved in Nanotechnology Advocacy

Organization	Type	Country
Animal Aid	Other (animal rights)	United Kingdom
Beyond Pesticides/NCAMP	Environmental (bio)	USA
BioWatch South Africa	Environmental (bio)	South Africa
Breast Cancer Fund	Other (public health)	USA
Center for Media and Democracy	Other (PR investigation)	USA
Citizen's Environmental Coalition	Environmental (bio)	USA
Clean Production Action	Environmental (toxic)	Canada/USA
Dag Hammarskjöld Foundation	Other (sustainable development)	Sweden
Dialogik	Other (communications research)	Germany
Ecology Center	Environmental (toxic)	USA
Econexus	Environmental (bio)	United Kingdom
Environmental Health Fund	Other (public health)	USA
Environmental Health Project	Environmental (toxic)	USA
Environmental Research Foundation	Environmental (global)	USA
GeneWatch UK	Environmental (bio)	United Kingdom
Greenpeace USA	Environmental (global)	USA
Institute of Science in Society	Ethical science and technology	United Kingdom
International Federation of Journalists	Other (human rights)	Belgium
International Forum on Globalization	Other (globalization)	USA
Loka Institute	Ethical science and technology	USA
Maryland Pesticide Network	Environmental (bio)	USA
Meridian Institute	Other (mediation)	USA
National Consumer Council	Consumer advocacy	United Kingdom
Pesticide Action Network North America	Environmental (bio)	USA
Pièces et Mains d'Oeuvre	Other (local activism)	France
Rachel Carson Council Inc.	Environmental (bio)	USA
Research Foundation on Science and Technology	Environmental (bio)	India
Science and Environmental Health Network	Environmental (bio)	USA
ScienceCorps	Ethical science and technology	USA
Sierra Club	Environmental (global)	USA
Silicon Valley Toxics Coalition	Environmental (toxic)	USA
Union of Concerned Scientists	Ethical science and technology	USA
United Steelworkers	Other (trade union)	USA
Women's Environmental Network	Environmental (global)	United Kingdom
WWF Japan	Environmental (global)	Japan