



Stakeholder's Attitudes towards the **European Code of Conduct** for Nanosciences & Nanotechnologies Research

Results from the quantitative survey and additional qualitative Interviews

Survey Results

Country Report "The Netherlands"

Published under the NanoCode project as deliverable D2.2 for Workpackage 2

Report prepared by:

David Bennett and Serene Chi, Delft University of Technology

With contributions from:

Dr Adrienne Sips National Institute for Public Health and the Environment

Prof. Dr. Andreas Schmidt-Ott Delft University of Technology

Dr Bärbel Dorbeck-Jung University of Twente

Ir. ing. Bart Walhout Rathenau Institute

Prof. Dr. ing. David H. A. Blank MESA+, University of Twente

Dr Daan Schuurbiens Radboud University Nijmegen

Prof. Dr. David N. Reinhoudt MESA+, NanoNed, University of Twente

George Biskos Delft University of Technology

Hadewijch van Delft Free University of Amsterdam

Henri Uitslag Consumers Union

Hillie van de Streek Foundation for Christian Philosophy

Dr Huub de Vriend LIS Consult

Drs Ineke Malsch Malsch TechnoValuation

Ingrid Elbertse Women in Europe for a Common Future

Drs Jacqueline Mout-Leurs Ministry of Education, Culture and Science

Dr Jeannette Hofman-Züter Netherlands Standardization Institute

Dr. J.W. (Hans) Hofstraat Philips Research

Prof. Dr. Lucas Reijnders Netherlands Society for the Conservation of Nature and Environment

Dr Lucien Hanssen Deining Societal Communication

Dr Marga Jacobs Association Urban Living Environment

Marja Zuidgeest Netherlands Society for Replacement of Animal Testing

Dr Maureen Butter Platform Health and Environment

Mingyan HU Delft University of Technology

Prof. Dr. Paul J.A. Borm Hogeschool Zuyd University, MagnaMedics Diagnostics BV

Prof. Dr. Peter Nijkamp Free University of Amsterdam

Dr Piet Schenkelaars Schenkelaars Biotechnology Consultancy

Drs Pieter van Broekhuizen (IVAM Research and Consultancy on Sustainability, on behalf of FNV)

Sybre ten Cate Delft University of Technology

Ir. Tanja van Tooren-Pijpaert Netherlands Standardization Institute

Tobias Pfeiffer Delft University of Technology

Dr Tom van Teunenbroek Ministry of Housing, Spatial Planning and the Environment

Valérie C.L. Butselaar-Orthlieb Delft University of Technology

Prof. Dr. Vinod Subramaniam MESA+ University of Twente

Prof. Dr. Ir. Willie Peijnenburg National Institute for Public Health and the Environment

Ing. Willem-Henk Streekstra Confederation of Netherlands Industry and Employers VNO-NCW

Index

Abstract	4
1 The participants of the survey / used methods	5
1.1 Questionnaire survey.....	5
1.2 In-depth interviews.....	5
1.3 Telephone interviews.....	6
1.4 Focus group	7
2 Analysis of the current situation	8
2.1 Awareness at country level (Type A)	8
2.2 Agreement / disagreement to the principles of the COC.....	9
2.2.1 Support and concerns over the Principles and the Guidelines.....	9
2.2.2 Comments on voluntary CoC as an implementation instrument.....	11
2.2.3 Dutch CSOs' view.....	13
2.2.3.1 Views on the EC CoC.....	13
2.2.3.2 Views on other initiatives.....	13
2.3 Compliance/commitment to the COC principles.....	14
2.3.1 Commitment	14
2.3.1.1.Dutch government's implementation efforts.....	15
2.3.1.1.1 Research culture and awareness - National funding programme	15
2.3.1.1.2 Precautionary measures - Legal/semi-legal tools & practical support	18
2.3.1.1.3.Communication - unbiased societal dialogue.....	20
2.3.1.2 Dutch industry's implementation efforts.....	22
2.3.1.3 Dutch academia's implementation efforts.....	24
2.3.1.4 Dutch CSOs' response	25
2.3.2 Information and knowledge sharing.....	28
2.3.3 Monitoring of compliance.....	29
2.3.4 Further challenges and opportunities in the Dutch context.....	31
2.4 Communication	33
3 Recommendations from the survey participants	35
3.1 Improvement of awareness and dissemination	35
3.2 Scope and revision of the CoC.....	36
3.3 Teeth and Monitoring.....	37
3.4 Web based tools	38
3.5 Other incentives	39
4 Conclusions : The CoC as a tool for responsible development of nanotechnologies research	40

Abstract

The Dutch Country Report of Survey Results on the European Commission Code of Conduct for Responsible Nanosciences and Nanotechnologies Research (EC CoC) is based on consultations conducted during the period of April to November 2010 with representatives from various stakeholder groups at national level. The research was carried out by means of a series of in-depth interviews with a selected number of key individuals, telephone interviews with leaders/spokespersons of Dutch CSOs, a focus group with university researchers and a web-based questionnaire survey. In total, 50 representatives from the Dutch Government, industry, public & private research institutions and civil society organisations have been involved in this survey.

The first section of the report sets out the methodologies used for this study. Section 2 provides a detailed analysis of the current situation in The Netherlands with regard to general awareness, opinions, commitment and communication of the EC CoC, its Principles and Guidelines. The final sections summarise the comments and recommendations collected through the survey.

The Netherlands is the first European Member State that has introduced the mandatory contractual obligation to comply with the EC CoC in its national funding schemes for N&N R&D. The characteristic, distinctive culture that endorses an ‘integrated and cooperative approach’ has contributed largely to the Dutch government’s early adoption of policies that promote responsible N&N research and the commitment of the Dutch research community, industry and unions to related initiatives. The EC CoC is generally considered as a useful tool that provides a framework for a more systematic approach to stakeholder communication and safety issues. The communication of the EC CoC itself is, however, relatively poor in The Netherlands and many survey respondents have voiced their scepticism to its effectiveness as an implementation instrument on its own. Nevertheless, the principles and guidelines addressed in the EC CoC have been largely endorsed and followed in current Dutch initiatives for responsible N&N research. Though many challenges remain, these Dutch initiatives should be able to provide valuable experience and insight for further implementation of the EC CoC Principles and Guidelines at both national and international level.

1 The participants of the survey / used methods

1.1 Questionnaire survey

A questionnaire, web-based quantitative survey on the EC Code of Conduct (CoC) was conducted over the period of August – September 2010 in The Netherlands as part of the wider Nanocode project survey. Invitations to take part in the survey were sent to 32 stakeholder representatives from responsible authorities, government-funded research institutes, academia, industry, media, private consultancy and civil society organizations. Amongst the 32 representatives approached, 17 of them filled in the questionnaire, resulting in a good response rate of 53%. Further correspondence with invitees who did not respond to the questionnaire shows that the reasons were the following:

- (1) lack of time
- (2) would prefer a face-to-face interview
- (3) inappropriateness of questions (most of the questions were designed for R&D researchers and thus may not be suitable for other types of respondents.)
- (3) lack of specific knowledge (some invitees indicated that someone else in their organisation would be better qualified to respond to the survey. In these cases, other suitable contact persons for in-depth interviews were recommended.)

The stakeholder categories addressed with the questionnaire were defined as follows:

1. RESEARCH: Academia, industry, public research institutions, etc.
2. BUSINESS: Production, retail, insurance and finance, industrial/professional organisations, etc.
3. INSTITUTIONS: Policy makers such as governmental departments and agencies, R&D governing bodies, regulatory and standards agencies, technical and ethical committees, etc.
4. CIVIL SOCIETY: Non-governmental organizations (NGOs); consumer, patient/public health, environmental, labour associations, etc.

From the valid 17 responses of the quantitative survey, 9 were from the research group, 3 were from businesses, 1 from institutions and 3 from Civil Society Organisations (CSOs). 1 person did not indicate any category.

1.2 In-depth interviews

In The Netherlands there is a characteristic culture of an integrated and cooperative approach with regard to both research and policy making, which clearly also applies in the case of nanotechnology. Networks of

major stakeholders in this field have been developed and many experts and opinion leaders have worked together through various initiatives and projects since the beginning of the Dutch national nanotechnology policy in 2006. In-depth interviews with network coordinators in this context is therefore the most appropriate and efficient way of gaining insight into the general situation in The Netherlands. In addition, the fact that the Dutch government not only holds a positive and transparent attitude toward risk research on nanomaterials but also plays an important role in coordinating major research programmes in this field also makes the in-depth interviews with responsible authorities the most effective way of insight into the latest policy and research development in the Netherlands. It is in this context that 21 in-depth interviews were arranged and held during the periods of April to May and October to November 2010 with key players and opinion leaders on nanotechnology research and policies in The Netherlands. Interviews were recorded with the permission of the interviewees which was given in all cases and key sections of the recordings were transcribed for further analysis and use in this report.

Among the representatives interviewed, 7 were from research institutions, 3 from CSOs, 6 from the industry including private consultancy, and 5 from policy making institutions including standardisation bodies.

1.3 Telephone interviews

Apart from a few exceptions, Dutch environmental and consumer groups have only shown limited interests on issues related to nanotechnologies. In view of the limited time and resources that these organisations are willing to spend on this topic, it is not possible to obtain their opinions on the EC CoC through research methodologies that require commitment of time such as questionnaire, face-to-face interview and focus group. Some even expressed slight irritation when they were approached with an invitation to participate in a stakeholder dialogue workshop. Their reasons included:

1. Limited resources and time constraints – CSOs have to weigh carefully what kinds of activities they participate in because they are frequently invited to participate in all kinds of meetings without a clear purpose, so that CSOs regularly find it difficult to judge whether a meeting sufficiently meets the interests they stand for;
2. It was insufficiently clear how the workshop results would be used and to what extent this would contribute to European and national policies, and;
3. Some CSOs lack confidence in the democratic character of current policy making by governmental authorities.

In order to overcome this difficulty, brief semi-structured telephone interviews with leaders/spokespersons of these CSOs were organised to replace the questionnaire survey and stakeholder workshop.

In total, ten CSOs in The Netherlands were approached with a request for a telephone interview of about 20 minutes based on a list of 11 interview questions, partly derived from the previously held online questionnaire. Seven CSOs and one person with knowledge about the discussion in the peace movement and development organisations agreed to participate in this way. In contrast, two CSOs flatly refused to collaborate, mainly because of their distrust of the democratic character of almost any policy or activity of governmental authorities in the field new technologies like biotechnology and nanotechnology and their

perceived insufficient clarity about further use of their comments.

1.4 Focus group

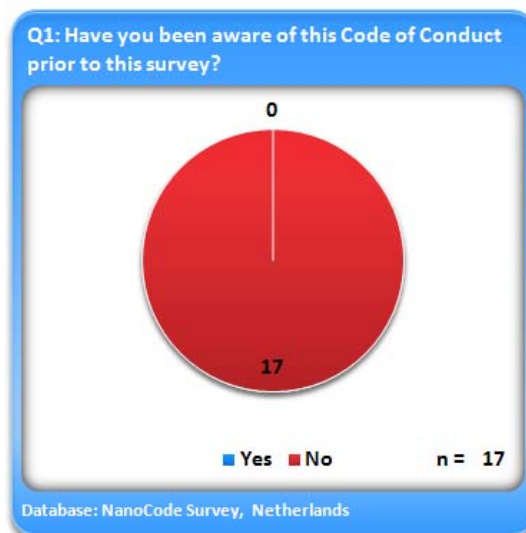
Opinions from academia researchers, especially voiced by junior researchers who are dealing with nanoparticles on a daily basis, are often easily overlooked in invited questionnaire surveys and selected interviews as they normally do not consider themselves as being in appropriate positions to speak for their institutes on matters related to wider policies. In order to obtain a more detailed discussion and understanding of university researchers' views on the implementation of EC CoC, an in-depth focus group discussion was arranged with a research team at the Delft University of Technology specialising in producing and monitoring nanoparticles.

The focus group meeting was arranged in the informal setting of a lunchtime discussion. PhD students were invited to reflect and brainstorm with their supervisor on various possible scenarios relevant to their own work and the implementation of the CoC. Background information on the EU CoC, Dutch government policy and latest discussion on scientists' social responsibility was provided both in advance and throughout the discussion when appropriate. The focus group discussion was recorded with the permission of the participants which was given by all and key sections of the recording were transcribed for further analysis and use in this report.

2. Analysis of the current situation

2.1 Awareness at country level

As mentioned in the analysis of the first country report, The Netherlands is very active in nanotechnology research and development both at national level and in the context of EU Framework Programmes (Type A country)¹. All the participants who responded to the questionnaire (100%) indicated that they had been aware of the CoC prior to taking the survey (Q1). Two factors can be identified through the comments made on the questionnaire that have contributed to such a high rate of awareness of the CoC: (1) around half of the respondents have been contacted directly by the European Commission or the Dutch government on their opinion on the CoC; (2) several respondents indicated that they were made aware of the CoC through our previous country report: *“I have contributed to the previous report”* (Researcher and company CEO), *“I was introduced to the CoC through XX who mentioned the previous country report to me.”*(University scientist)



However, results from in-depth interviews show that many stakeholders, though being aware of the existence of the CoC, are not familiar with its contents and have only very limited knowledge regarding its current status.

“We thought that the European Code of Conduct was going to be withdrawn at some point and only very recently came to realise that it is actually an accepted policy”. (Labour union)

“No one cares about the Code.” (SME)

Interviews with young researchers show that most young university scientists have not been made aware of the CoC. *“I haven’t been informed about the Code”* (University scientist) *“I wasn’t aware of its existence.”* (University scientist). Interviews with CSOs show that most of them are aware of the existence of the CoC but not familiar with its contents: *“We haven’t done any study on this Code so far.”* (Environmental CSO)

¹ “Type A Country” is defined by the NanoCode consortium as countries with a strong activity in nanotechnologies and, often, a specific national initiative in this field

2.2 Agreement / disagreement to the principles of the COC

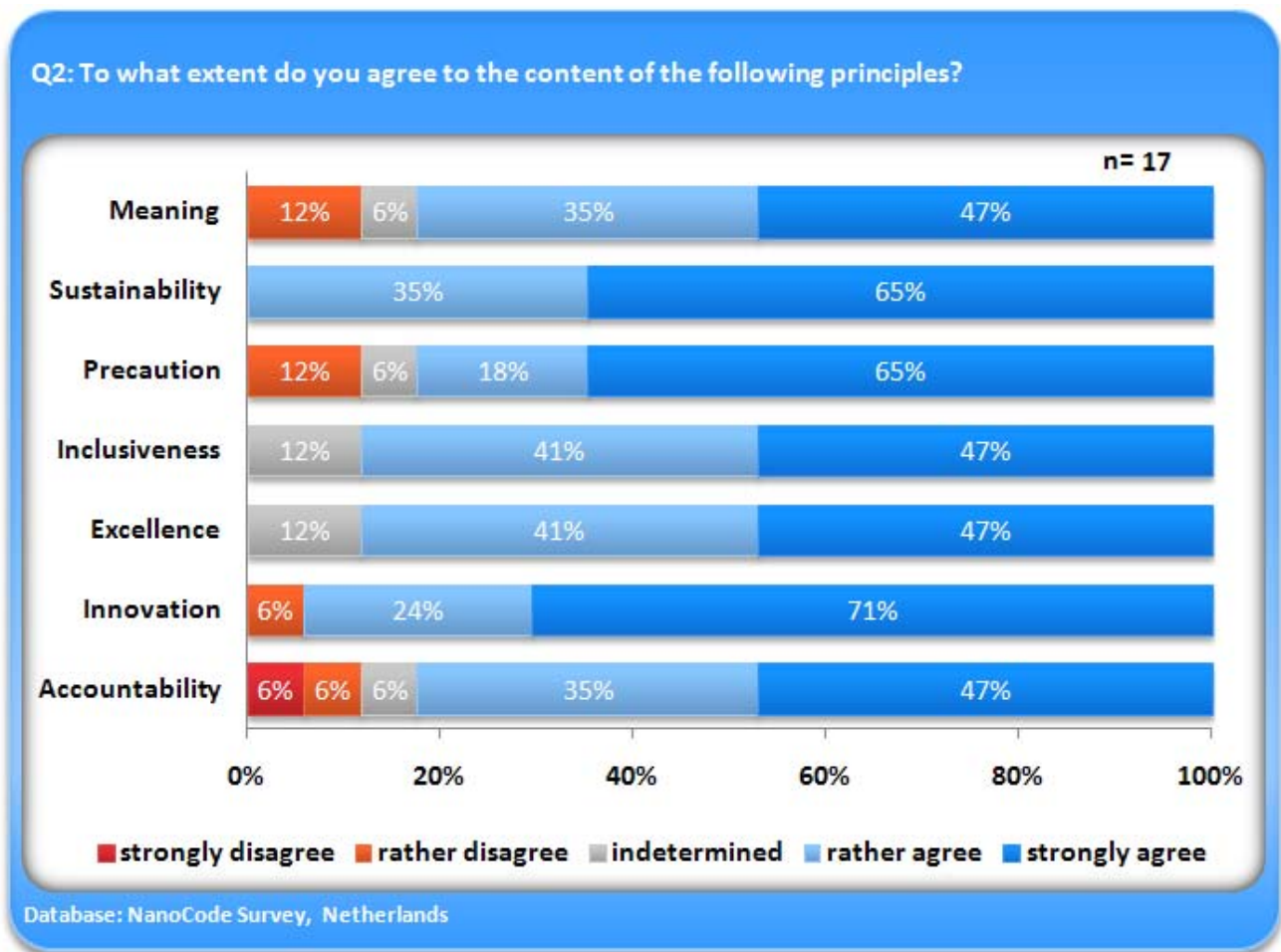
2.2.1 Support and concerns over the Principles and the Guidelines

In general, questionnaire respondents largely agree with the CoC principles (Q2). All principles received a high percentage of agreement (“strongly agree” or “rather agree”) of between 82% and 100%.

“Sustainability”, “Inclusiveness” and “Excellence” received very clear levels of support of 88-100% (all 100%, if including “undetermined”). Sustainability received full support (100%) from all the respondents. “Innovation” also received very strong support of 95% and only one respondent doubted if innovation should be given such a priority.

“Only sustainable nanoproducts will survive, let's focus our R & D and invest our money on those. (University scientist and company CEO)

“Meaning”, “Precaution” and “Accountability” received the lowest agreement in the survey (82-83%) and some levels of disagreement (12% of “strongly disagree” or “rather disagree”). “Accountability” is the only principle that received some strong disagreement.



Comments from the survey show that the concern with the principles of “meaning” and “precaution” rest on the condition of public comprehensibility.

“I agree that N&N should respect fundamental rights and be conducted in the interest of the well-being of individuals and society in their design, implementation, dissemination and use, but the condition of public comprehensibility is tricky, given the complex science driving N&N and the public's general scientific illiteracy. Nonetheless, substantial efforts should be devoted in trying to explain the science behind N&N to the public.” (Environmental consultant)

The principle of “Accountability” received most disagreement and comments from the survey respondents. Most worried that long term effects will be difficult to foresee and researchers have very limited control over the long supply chain; therefore, it is not realistic to require research scientists to be accountable for all the potential adverse impacts related to their research.

“The very nature of groundbreaking research is that it is impossible to know beforehand all long-term impacts. Thus, one must allow some leeway for the unknown.” (University scientist)

“Regarding accountability: it is a long chain from fundamental research to market applications. It is not realistic to keep all researchers and research organisations involved in this chain accountable for such issues as safety.” (Public research institution representative)

Several respondents made comments expressing their reservations toward these principles with regard to their implementation and practicality:

“I doubt the way they are thought to be implemented” (Public research institution representative)

“The problem is not the principles but how to put them into practice. Furthermore, these principles should govern all research, not just nanoscience.” (Independent consultant)

“There is a gap between what is expected here, and what is realistic to implement in the daily work. If there is more pressure to produce results, then the way how it is achieved becomes a lower priority. These points seem too idealistic. But in the ideal case I would agree that these points would be nice guidelines to follow.” (University scientist)

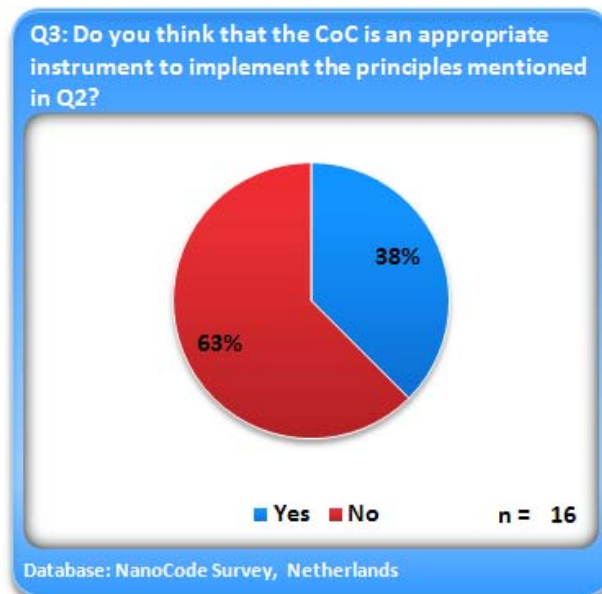
In-depth interviews with the Dutch funding authorities revealed that Dutch research scientists have voiced their concern regarding the wording and scope of Section 4.1.17 of the CoC which provides that

“As long as risk assessment studies on long-term safety is not available, research involving deliberate intrusion of nano-objects into the human body, their inclusion in food (especially in food for babies), feed, toys, cosmetics and other products that may lead to exposure to humans and the environment, should be avoided.”

Researchers were worried that implementation of Section 4.1.17 may lead to a moratorium on certain types of research in nanomedicine, nanofood and nano-enabled personal care products. All these three fields are important research areas in The Netherlands. They made comments that putting such products on the market should be avoided but the research should not; if research is also banned there will be no means to find out what is toxic and what is not. They also made the comments on the presumption of nano objects in food as potentially harmful: the potential benefits were not taken properly into consideration. For example, nano objects in food may lead to desirable products such as low fat milk.

2.2.2 Comments on voluntary CoC as an implementation instrument

When being asked whether they think the CoC is an appropriate instrument to implement the principles outlined in the Code (Q3), most respondents expressed their doubt as to the effectiveness of the CoC as an implementation instrument. 63% of the questionnaire survey participants gave a very straight answer of “No” to this question. Most of the survey participants who answered “Yes” made comments either on the questionnaire or during interview addressing the need for further supporting mechanisms. The majority (69%) of the questionnaire survey participants indicated that they think voluntary codes need “teeth” in terms of enforceability and monitoring (Q5_4).



“I don't like (voluntary) Codes of Conduct, as they are commonly used by commercial parties for legitimisation and depoliticisation of public debates.” (Environmental consultant)

“The OECD Working Party on Manufactured Nanomaterials, Sub-Group 5 has reached the conclusion that worldwide voluntary measures concerning nano do not work, hence the regulators are stepping in now, the EPA, France Germany” (Government Ministry official)

“Nanny state approach - you cannot change deeply ingrained patterns of behaviour (such as common decency, or rather a lack thereof) by asking people to adopt a code.” (University scientist)

“it's a necessary starting point, so more has to be done as well.” (Public research institution representative)

“There are no sanctions available to enforce the rules that can be derived from the principles (Social science researcher)

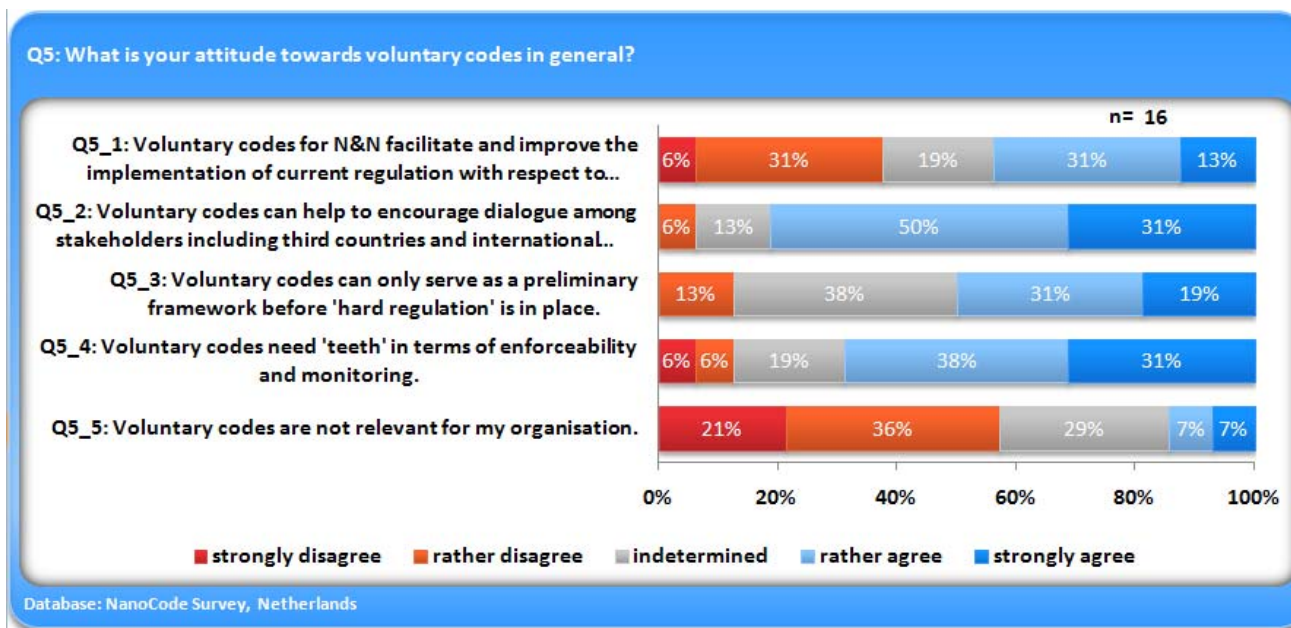
“it will be a paper tiger - not able to bite” (Government Ministry official)

However, given the reservation they had with regard to the effectiveness of the CoC, questionnaire survey participants in general consider voluntary codes as “relevant” to their organisations (Q5_5) and especially as a helpful tool to encourage dialogue among stakeholders (Q5_2).

“Nobody is interested in the code, but might be in its consequences for their products.” (SME)

“It is a very good tool to help raise industry and research centres' awareness on the issues.” (Business representative)

“I think that a voluntary code shows to others which things are important for your company. Also, for example, if you set up a code to work in a safe way, that fact of having such a code can work in your benefit. The public opinion will be better if you have such voluntary codes, because it shows that you care about a certain level of quality.” (University scientist)



The interview and focus group survey results correspond largely to the questionnaire survey on these aspects. University scientists interviewed all have reservations about the effectiveness of voluntary codes and addressed the need for further practical guidance. Representatives from the industry and CSOs seem to have opposite views as to whether the CoC should better be implemented on a voluntary basis. However, both agree that the CoC can help to raise awareness and can provide a systematic framework to approach issues of safety and communication.

“The EU CoC doesn’t have to be compulsory. The companies have already tried to incorporate it into their quality assurance programme and through that there will be business pressure throughout the supply chain that will help to bring the awareness of the code.” (Business representative)

“The Code is considered as a ‘basic’ code, a starting point. Each different sector can then write their own more detailed code of conduct based on this Code. A broad and voluntary code is more efficient in a way that it can be developed and adapted faster and leaves flexibility for the industry and researchers to address detailed issues which are more relevant to their sectors.” (Business representative)

“This code can help to offer a more systematic approach to deal with the safety and communication issues. It is a very good tool to help raise industry and research centers’ awareness on the issues”. (Business representative)

“We have experience in The Netherlands that a voluntary code is not as useful as regulation. Where the industry is concerned, corporate life is not like those of other professions such as doctors’ or lawyers’. If they don’t follow the code of conduct, there is no way to move them out of the profession.” (CSO representative)

“A code of conduct may be a useful tool if the researchers do believe in what they sign up for. Most of the risk debates are originated by research scientists. If some good scientists are willing to abide to such a code, there might be some early warning signals being given out from the expert community and they can initiate and contribute to good discussion.” (CSO representative)

2.2.3 Dutch CSOs' view

2.2.3.1 Views on the EC CoC

Voluntariness

All CSOs interviewed share the view that a voluntary N&N CoC should neither be a substitute for legally binding regulations on N&N research and applications, nor be used as a public relations instrument. Nevertheless, in the absence of legally binding (safety) regulations on N&N research and N&N applications *“something is better than nothing”*.

Several environmental and women’s organisations expressed concerns about voluntary CoCs because they would often not be effective, require a lot of resources and lead to bureaucracy and much waste of paper. The Christian organisation notes that subsidiarity and ‘sovereignty in the own circle’ are key principles for the organisation; it therefore supports voluntary approaches that allow citizens, stakeholders and governments to adapt CoCs to their own principles and needs. In contrast, the labour union views voluntary approaches as problematic because they cannot be enforced adequately.

The Society for Replacement of Animal Testing is not in favour of regulating everything, but is also against approaches without liability. In its view, regulation is *‘solidified ethics’* and often lags behind practical initiatives. The organisation points at that the ethical committees for animal experiments were installed in most cases in The Netherlands long before it was made compulsory by law. From this experience, the organisation favours permanent interaction between research institutions and companies involved in animal experiments with compulsory reporting as a tool to force research institutes and companies to keep ethical issues on the agenda and to reflect on what they are doing. The organisation does not oppose a N&N CoC.

Covering the relevant issues

Most CSOs consider the N&N CoC reasonably well drafted because it addresses most issues they regard as important. But several CSOs also express scepticism. One environmental organisation for example argues that implementation of a N&N CoC will meet opposition from boards of universities and public research institutions. In its view, a N&N CoC might be more appealing to pharmaceutical and chemical companies. From its experience with voluntary agreements between companies and CSOs, it recommends developing and implementing N&N CoCs that are tailor-made for specific (groups of) companies.

A framework for international discussions

One of the interviewees thought that the N&N CoC would be particularly useful for publicly funded N&N researchers as a framework for international discussions to reach consensus on responsible N&N applications, to prevent the emergence of trade barriers and to provide workers and consumers with an equal level of protection worldwide.

2.2.3.2 Views on other initiatives

According to one environmental organisation, some pharmaceutical and chemical companies are now voluntarily adopting high occupational safety standards in the absence of legally binding regulations on nano-particles. The labour union is aware of a few other initiatives such as the UK Responsible Nanocode. Further, companies such as BASF and Bayer have also introduced a CoC, while retailers in Switzerland require information about the presence of nano-materials from their suppliers.

Another environmental organisation points at that NanoPodium, a multi-stakeholder dialogue initiated by The Netherlands Government, is viewed as *‘mawkish and fluffy’* because the initiative insists that there should be dialogue and not debate therefore possible risks should not be a subject of the debate/dialogue within NanoPodium.

The womens' organisation refers to the so-called "Code Tabaksblatt", a CoC that sets rules for tasks, methods and remuneration of board members of companies registered in the stock market. In its view, this CoC has so far not been particularly successful. Other 'codes', like 'fair-trade' or 'organic', demonstrate that CoCs can be successful if there is an incentive or reward. The anti-vivisection organisation would like both public institutions and companies to apply Corporate Social Responsibility principles.

2.3 Compliance/commitment to the CoC principles

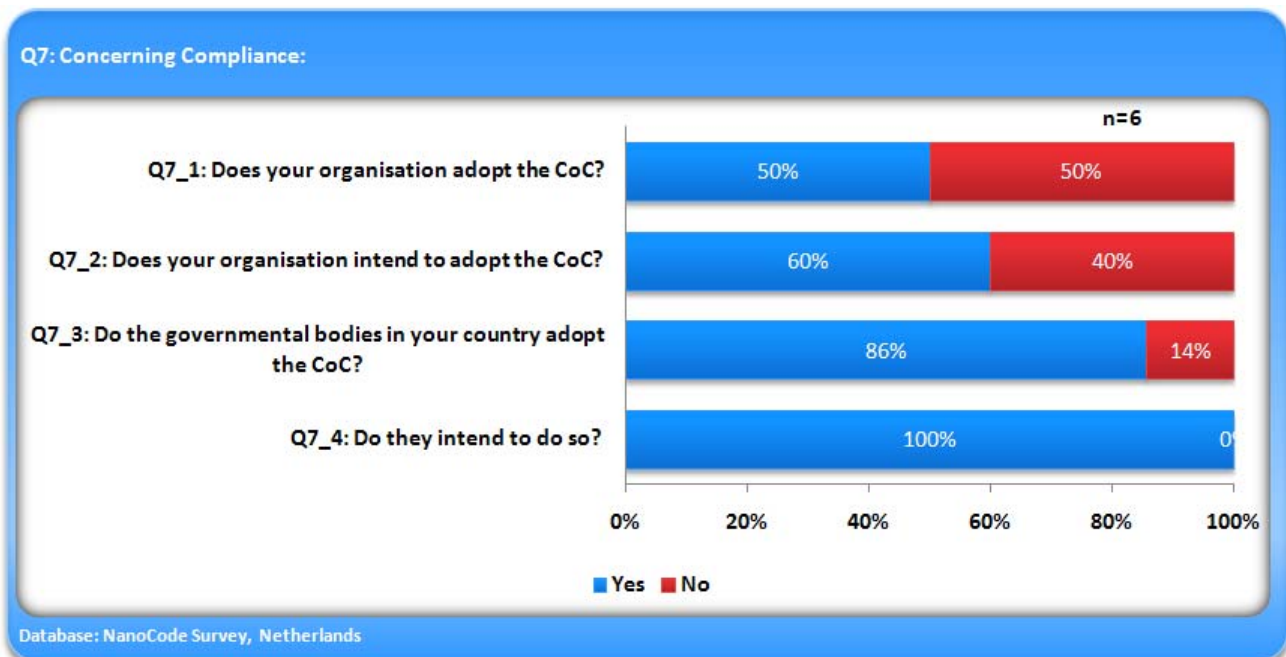
2.3.1 Commitment

More than 50% of the respondents reported that their respective organisations had already adopted (Q7_1) or intended to adopt the EC CoC (Q7_2). Interviews with those who answered "No" to this question revealed that most of these respondents did so because they consider their organisation is not involved in R&D activities (e.g. social science department, government agencies) therefore the EC CoC does not apply to them, or they do not know in what way it would apply. Some respondents answered "No" because they do not consider the CoC as useful.

"I do not know how to answer this question, because my organisation is not involved in R&D." (Social science researcher)

"To be honest, I am not using the EU Code of Conduct." "The Government should define a set of best practice instead of a Code of Conduct." (SME)

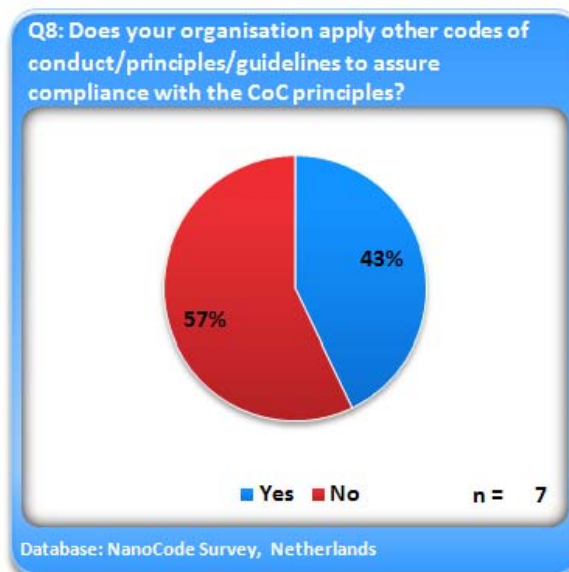
All respondents were either convinced that the Dutch government bodies had already adopted the CoC (86%) or at least intended to do so (100%).



Only 43% of the respondents indicated that their organisations have adopted other codes of conducts/principles/guidelines to ensure the compliance of the CoC principles (Q8). The reason is the same as to those reasons provided to Q7_1 and Q7_2.

“If not reinforced codes are simply ignored in my organisation” (SME)

“I'm not sure about this question. As a non-science research organisation, the department I'm now working at has a tradition to do research on ethics of technology.” (Social science researcher)



2.3.1.1. Dutch government's implementation efforts

It should be noted that the Dutch government has had a nanotechnology policy that address responsible research since 2006, before the EC CoC. Most of the issues addressed in the EC CoC have already been addressed through the Dutch government policy on nanoscience and nanotechnologies.

Recommendation 3 of the Commission Recommendation of 07/02/2008 on a Code of Conduct for Responsible Nanosciences and Nanotechnologies Research states that:

“Member States consider such general principles and guidelines on research to be an integral part of institutional quality assurance mechanisms by regarding them as a means for establishing funding criteria for national/regional funding schemes, as well as adopting them for the auditing, monitoring and evaluation processes of public bodies.”

In response to this recommendation, The Netherlands is the first European Member State that has introduced the mandatory contractual obligation to comply with the European Code of Conduct in its national funding schemes for N&N R&D.

2.3.1.1.1 Research culture and awareness - National funding programme

Identify key problems and opportunities

In order to develop good governance strategies for nanotechnologies, the responsible authorities in The Netherlands have identified the following key gaps and opportunities that need to be addressed to ensure responsible N&N research.

(1) A general culture of responsibility

Section 4.1 of the EC CoC specifies that for a good governance of N&N research, *“A general culture of responsibility should be created in view of challenges and opportunities that may be raised in the future”*

The Dutch government has also identified the general research culture as a key issue to ensure responsible N&N research: *“Over the past few years, the legislation on chemical safety, labour conditions and consumer*

and environmental protection have changed to clarify the producers' overall responsibility on product safety. The responsibility to investigate the risks and develop strategies to control them lies primarily on the producers, not the Government. The researchers and the industry are still not fully aware of this latest development. The general research culture is still very much focusing only on improving supply with a passive approach on safety and societal issues, waiting for the Government to tell them where they can go wrong.”(Government Ministry representative)

Section 4.1.6 of the EC CoC provides that *“Member States should ensure that appropriate human and financial resources are dedicated to the application of existing laws and regulations applicable to N&N research...”*.

The Dutch Government also acknowledges that *“The key task of the Government is to provide a good structure, where this responsibility can be clarified and researchers and industry are made aware of it, while at the same time sufficient supervision, coordination and funding are provided so the desired result can be delivered.”* (Government Ministry official)

(2) Risk assessment methodology

Section 4.1.12 of the EC CoC states that *“N&N research funding bodies should devote an appropriate part of the N&N research to the development of methods and tools for risk assessment, the refinement of metrology at nano-scale.....”*

The Dutch Government has also identified lack of appropriate testing methods as a key issue for responsible N&N research. *“With regard to nanotechnology, the biggest problem at present time is that there are no proper methodologies for risk assessment therefore it is not possible to assess the risks properly. Existing OECD test guidelines do not offer any information on the quality and safety aspect of nanoparticles. As most of the research in this field in The Netherlands is conducted through Government funding to academia, effective integration and coordination of safety and social aspects into Government funding programmes is, therefore, of paramount importance in the current situation.”* (Government Ministry official)

(3) Coordinated risk research

The Netherlands Government is of the view that safety matters should be considered with a broader view in mind. Nanotechnologies as enabling technologies have great potential to influence the safety aspects of many other controversial products such as nuclear power and even influence the general production models in terms of energy use. This is an important aspect that is missing in current debate. The Government has also taken into consideration that many Dutch research institutions such as the National Institute for Public Health and the Environment (RIVM) are leading international toxicological research for policy development in this field. In this context, risk research has been given a priority role in the Dutch N&N research policy, not only as a key issue to address but also a key opportunity to lead development in the field.

The Dutch Government has put special attention on the efficiency and effectiveness of risk research with regard to how to maximise the contribution of existing data and avoid duplication and waste of funding.

The interviews show that the need to address the efficiency and effectiveness of risk research is also widely acknowledged by the Dutch academia and industry:

“There are a lot of demands for funding for research on toxicology, but very few results are really aimed at advancing the conception of understanding. Most of the research is focusing on the same questions, repeating the same tests, just changing the materials. Funding for risk research shouldn’t just be about valid and logical scientific questions, but also ‘how’ we can use the results to understand the action of nanoparticles and to advance regulation.” (University scientist and company CEO)

It is therefore a shared view that a better coordinated risk research programme will contribute significantly to the actual advancement and dissemination of knowledge.

Action plans

As addressed in the previous Netherlands Country Report, an “Integrated and cooperative approach” has been the distinctive feature that provides much advantage to Dutch policy development in this field. Since the first policy communication between the Dutch Government and the Dutch Parliament “*Cabinet Vision on Nanotechnologies*”², an inter-departmental committee on nanotechnology³ was envisaged and established to facilitate discussion and coordination between the relevant Ministries. Thanks to this framework, government agencies are very familiar with, and can relate to, the views and problems of N&N R&D from different viewpoints. *“We have been working together with 8 or 9 Ministries for more than 4 years now, and we are very familiar with and can relate to the views and problems from different viewpoints.”* (Government Ministry official) The importance of safety research and researchers’ general awareness about their responsibilities has become a shared view between leading responsible agencies including the Ministry of Economic Affairs. In this context, when the proposals for the latest round of the main national funding programme, the High Tech Systems and Materials theme of the Economic Structure Enhancing Fund (FES), were formulated, sufficient funding was made available not only for fundamental scientific research but also for risk and societal aspects.

A general contractual obligation to comply with the EC CoC has been introduced in the grant agreement to ensure the awareness and commitment of the grant holders to the principles and guidelines outlined in the EC CoC.

With regard to risk research, the Government’s position is that Government innovation funding, even if managed by industry, should provisionally have 15% reserved for risk aspects of innovation. Although if proposals are aimed at initial, conceptual phases, then the percentage can be less because the risk aspect is less. The more the innovation moves toward marketable products, the higher the percentage of funding that should be spent on addressing the safety aspects. In the second FES programme, a fund of €125 million is being allocated to nano- and micro-technologies. Risk and technology assessment is integrated into the programme as the first chapter of the programme document. 15% of this budget is allocated for safety aspects.

² *Kabinetsvisie Nanotechnologieën: Van Klein Naar Groot*, House of Representatives, Session Year 2006–2007, 29 338, no. 54 reprint.

³ *Interdepartementaal Overleg Nanotechnologieën (ION)*

The research on safety aspects is further divided into three tracks:

- Track 1: Research line on toxicology: focusing on developing methodologies to assess risk and the actual risk assessment activities
- Track 2: Cross linkage in data: focusing on examining the cross-linkage and use of methodologies and data, e.g. research from nanomedicine such as imaging may be adapted and used for occupational safety.
- Track 3: Requirement for all Government-funded PhD researchers to include a chapter in their thesis and a section in their publications on the safety aspects of their research.

Track 2 was designed to check the existing data, preventing duplication, and make the best use of them. It is also designed to improve awareness of researchers who are not involved in nano risk research, “*to let them know that there may be something and they need to know about it for health and safety considerations.*”(Government Ministry official)

Track 3 was designed to ensure researchers reflect and address the EHS and life-cycle aspects of their research. It was also designed with the aim of knowledge dissemination that not only the students but the supervisors and people who read the thesis will learn more about risk research.

2.3.1.1.2 Precautionary measures - Legal/semi-legal tools & practical support

Precautionary measures for working with persistent synthetic nanoparticles were recommended by the Health Council of The Netherlands in 2006 and supported by the leading responsible agencies, Ministry of Housing, Spatial Planning and the Environment (VROM) and the Ministry of Social Affairs and Employment (SZW).

Work safety

As mentioned in the previous Netherlands Nanocode report, “The Dutch Polder Model”, the tri-partite cooperation between employers’ organisations such as the Confederation of Netherlands Industry and Employers (VNO-NCW), labour unions such as the Federation Dutch Labour Movement, and the Government, has provided a forum embodied in the Social Economic Council (Sociaal-Economische Raad, SER) for discussions of labour issues and has a long tradition of consensus decision-making. This social context has offered a unique opportunity for The Netherlands in terms of safe handling of nanoparticles in the work place. The labour unions have served as a communicator and bridge between the Government and the industry, proposing policy frameworks and supporting the implementation of policy decisions.

The SER supports and coordinates several activities and programmes related to risk management of nanomaterials in occupational settings. In March 2009 the Council published the “*Advisory Report Nanoparticles in the Workplace: Health and Safety Precautions*”, holding the opinion that precautionary measures should be adopted when working with nanoparticles. In order to implement the precautionary principle, the Council also addressed in the report the importance of knowledge dissemination with regard to existing laws and risks of NP and the need for a special **reference scheme** for exposure of nanomaterials as good practices guidelines to assist the implementation of existing safety law.

In the report, the Minister clarified and defined the responsibilities of the Government and social partners in terms of implementation of the precautionary principle, the good practices guidelines and knowledge dissemination with reference to existing laws and knowledge about risks. It was made clear that employers

must apply the provisions of the Working Conditions Decree to working with hazardous substances. This leads to a number of obligations:

- the company's Risk Inventory and Evaluation (RI&E) must devote attention to the risks of possible exposure to nanoparticles;
- the company must put measures in place to prevent or control exposure;
- the company must inform and instruct employees who work with nanoparticles regarding the associated risks and the measures to be taken.

The Minister made clear in the report that provisions from relevant guidelines can be included in the "health and safety catalogues" [arbocatalogi] drawn up jointly by employers and employees. These can in turn serve as a frame of reference for enforcement by the Labour Inspectorate and become practical semi-binding legal tools to support the implementation of existing laws in the setting of N&N R&D. As a result of a joint effort between the government, the industry, the union, academia and public research institute (RIVM), in 2010 the Dutch government recommended ⁴ a German system of reference values for exposure limits of nanoparticles and these reference values have now the legal status of semi-binding criteria for relevant labour inspection. Follow-up research projects on nano reference values with regard to feasibility for SMEs on a sectorial basis and their legal implications have also been funded and are carrying out as a joint venture between the government, the industry, labour unions, academia and public research institutes (RIVM).

Special efforts have been made in The Netherlands to address the need for support for risk management in SMEs. In 2007, a survey report titled *"Dealing with Nanoparticles in the Workplace (Omgaan met nanodeeltjes op de werkvloer)"* was drawn up at the request of the Ministries of SZW and VROM by the Centre of Expertise in Life Sciences (CEL) at Zuyd University, in collaboration with the Arbo Unie⁵ Expertise Centre for Toxic Substances and the DSM company's Occupational Health and Safety Service to provide an initial understanding of the exchange of health and safety information and dealing with waste of NP especially in SMEs. A free online risk management system, the "Stoffenmanager Nano", has been developed and will be released in 2011 to assist SMEs in risk management and regulatory compliance. Philips Research⁶ and Delft University have also successfully developed the cutting edge technology for a portable NP monitor to serve the practical need of monitoring nanoparticle exposure at work environment. Various projects funded by the Dutch government to support knowledge sharing are carrying out by the labour union, the industry and public research institute. For more details of these projects, please consult the following section on industry's implementation efforts and section on information and knowledge sharing.

Health Council of The Netherlands has organised a project and expert committee on monitoring the health impact of nanomaterials with involvement of experts of relevant fields and discussion started in 2010.

⁴ RIVM report 601044001/2010, 'Tijdelijke nano-refertiewaarden, bruikbaarheid van het concept en van de gepubliceerde methoden'.

⁵ Occupational Health Service of The Netherlands, www.arbounie.nl

⁶ AERASENSE[®]

Product safety

Commissioned by the Ministry of Health, Welfare and Sport (VWS), the Health and Food Safety Authority (VWA) has conducted a survey of nano consumer products currently sold on the market and investigated how companies fulfil their responsibility for safety regarding nanomaterials in their products. A basic product inventory has been created by RIVM and VROM. Studies have also been commissioned to investigate methods for detection of nanomaterials in both food and non-food consumer products. This line of research is considered to have been reasonably successful and progress is promising.

The Dutch Government is of the view that the proposed mandatory registration of nanomaterials that is currently under discussion in the European Commission (DG SANCO especially) and many Member States' parliaments is not a sensible approach. Every product, if well analysed, has nanoparticles in it. The question is whether this is intentional and whether it will cause problems. This is also relevant to the current EU regulatory struggle over definition of nanotechnologies and nanoparticles.

"From a legal point of view, it is very difficult to make a legal definition if we don't have a specific aspect of the functionality in mind. Dimensional definition of a nanoparticle is not conclusive with regards to the safety aspect, because safety is very much hinged on functionality. Also, the distribution of size is another challenge for legal definition. Almost in all the products, we get the whole distribution in size, distribution in shapes and in functionality, so from the legal point of view it is very difficult to know what to address but from the toxicological point of view it is not such a great problem. Analysis can be done on the whole loads of products. Therefore, from the aspect of safety, it is paramount that we have any kind of definition, it doesn't matter what, and just move forward." (Government Ministry official)

2.3.1.1.3 Communication - unbiased societal dialogue

An independent committee for the purpose of facilitating social dialogue, The Committee on Social Dialogue of Nanotechnology (Commissie Maatschappelijke Dialoog Nanotechnologie, CMDN), was envisaged in the Government's Nanotechnology Action Plan [*Actieplan Nanotechnologie*]⁷ in 2008 and was established in March 2009. The Committee has initiated the NanoPodium platform for organised societal dialogue. Nanopodium, together with NanoDialogue, an initiative from the Rathenau Institute, form the backbones of the Dutch social dialogue activities.

The Rathenau Institute has helped the Government in mapping ethical and societal aspects of nanotechnology and concluded that most issues are related to converging technologies at the nanometer scale (nano, bio, information technologies and cognitive sciences). The results have been presented to the Committee on Social Dialogue of Nanotechnology to be taken into account in its public agenda.

The CMDN has drafted a public agenda entitled "*Towards a Social Agenda on Nanotechnology*" presented at the Nanopodium event held on 29 September 2009 in the Nieuwe Kerk in The Hague. The event attracted around 150 participants and marked the beginning of the process of Dutch social dialogue on nanotechnology. Drawing on the lessons learned from the GM debate, The Netherlands Government's €3 million Nanopodium public engagement initiative is consequently carrying out a large number of small,

⁷ House of Representatives, Session Year 2007–2008, 29 338, no. 75

varied activities throughout the country on the basis of calls for proposals from individual people and organizations instead of national consensus conferences.

In total 73 proposals were submitted for the first call for proposals and 21 proposals were funded. These projects were launched in December 2009 to be carried out in the subsequent six months. The projects are divided into five groups: television programmes, publications for a broad audience, activities for secondary school students, science cafes/debates and others. A second call in January 2010 led to a further 67 submissions of proposals and around one-third of the proposals were granted funding support.

Key to successful societal dialogue

Participants in an international workshop on experience on nanodebates around the world and Nanopodium activities have showed strong support to the current Dutch approach on societal dialogue. Two key factors have been identified by the CMDN as crucial to reach such appraisal:

“Firstly, we are not necessarily going for consensus. It is fine everyone has different views. There is quite a bit of consensus in the end, but no one was left feeling of being forced into certain opinion. Everyone is expected as a partner and anyone who has something to say is seen as a partner. Therefore it is not leading to a normative statement in terms of what should be done. The Committee only gets the mandate to organise a structured informed dialogue with the society, not exclusively for researchers or NGOs, in individual or organised form, whoever feels he has something to say should be able to find some information.”

“The second important factor is that the Committee is completely independent from the Government. We have our own budget, the government will not intervene in any way on how the budget is used. For a simple reason - not to repeat the catastrophe of GM debate, the Government has said, as a strategic decision, that we have our own programme, an independent Committee, and should not have a view of nano that it is good for us.” (Government Committee representative)

Support for dialogue on risk

In The Netherlands, there is a special risk assessment committee set up by the Ministry which has existed already for quite some time. The risk assessment committee is responsible for testing and support for industry regarding implementing the REACH guidelines. RIVM also has a special group working on risk assessment of technology including nanotechnologies. *“They can do all the factual and empirical research. If anyone has any questions they can contact them and ask them; our work is not to do the research, but organise the dialogue. In this context, whenever there is a risk problem (factual questions) which the coordinators of Nanopodium can not immediately judge (e.g. if there is a risk, is it risky from a nano perspective?), it would be taken on board (but not telling people not to discuss it!) and passed on to the government risk assessment committee or the research group in RIVM. That’s the approach we adopted and it works out very well so far.”* (Government Committee representative)

Challenges in the Dutch context

A concern that has been addressed by the societal dialogue committee was that the Dutch branches of

several major international CSOs have shown very limited interest in nanotechnologies and have not (and seem not willing to) invest much resource on societal dialogue on nanotechnologies.

“Some of the NGOs such as Friends of the Earth and Greenpeace, sometimes at some unexpected stage, might decide to stand up and create quite some confusion in the system whatever it might be.” (Institutional representative)

With this concern in mind, the Nanopodium coordination team has deliberately approached these groups to invite them to the activities and inform them about the progress to ensure that their opinions will be included. *“We are really trying to avoid a big uproar at some stage, but if it happens as a result of the normal dialogue then it is not a problem of the dialogue itself but a fact of life.”* (Government Committee representative)

2.3.1.2 Dutch industry's implementation efforts

Interviews with representatives from the industry showed that there is some degree of difference between industry associations, big companies and SMEs in their views on the usefulness of the CoC. Industry associations and big companies regard the CoC as a useful tool to set up a frame for safety and communication issue, while SMEs are not very interested in the CoC, seeing it as not a very helpful tool for the practical safety questions and liability concerns that they are facing. However, all representatives from the industry welcome more detailed guidance materials that address the needs of different application areas and sectors to be developed on the basis of the EC CoC.

Guidelines on safe handling of nanomaterials

The Confederation of Netherlands Industry and Employers (VNO-NCW) has developed the *“Pointers for Working with Nanomaterials [Handreiking voor het werken met nanomaterialen]*⁸ These “pointers” sketch the outlines for approaching risk policy when working with nanomaterials. The basic principle is that there needs to be a difference in approach in order to reduce exposure; activities utilising dry nanomaterials that can easily be released require a different approach and measures from activities involving nanomaterials in solid and fluid matrices. The standard order for managing risks also applies when working with nanomaterials. The measures involved have to do with technical, organisational, and personnel matters: collect as much relevant information as possible and process the free nanoparticles as far as possible in an enclosed area, otherwise make sure that the area used has good ventilation or some other type of breathing protection and protective clothing is worn. The main approach is then worked out in detail according to the steps in the steps proposal for a set of best-practices guidelines.

Amongst other things, these comprise:

- carrying out a hazard assessment;
- identification of all tasks and actions involving potential exposure, the measures to be taken, and their effectiveness;
- providing information and training for employees and health monitoring.

⁸ http://www.vno-ncw.nl/SiteCollectionDocuments/Meer%20informatie/handreiking_voor_werken_met_nanomaterialen.pdf

This guideline is current under revision and VNO-NCW is currently running a project to update it.

Other projects and action plans

Apart from revising the “pointers”, VNO-NCW is also involved in several national and regional projects to support entrepreneurs interpreting the precautionary principle, to reduce uncertainty for companies with regard to the risks of nanomaterials and to encourage active communication on risk management.

1) Support to entrepreneurs on interpretation of the precautionary principle and implementation of precautionary measures:

To support Dutch entrepreneurs in adopting appropriate precautionary measures, the industry association has worked on the “*Nano reference value for nanoparticles*” and “*Handbook - working with nanomaterials*” projects to develop practical supporting instruments needed for this purpose. The industry association is also involved in a project investigating exposure of nanoparticles in the paint industry supply chain. The paint industry is one of the major sectors in The Netherlands where nanomaterials are widely used. The aim of the project is to investigate the points of exposure to nanoparticles along the supply chain, identify potential risks and to develop a working catalogue. There are also further projects planned to identify sectors where a similar study of exposure to nanoparticles in the supply chain may be useful for the adoption of precautionary measures. To support SMEs on risk management, VNO-NCW is also involved in the development of a nano-module of the online risk management system, Stoffenmanager (*Stoffenmanager Nano*).

2) To reduce uncertainty for companies about the risks of nanomaterials and their applications:

Two projects have been developed for this purpose:

(a) '*Knowledge Sharing*' project: in which government, companies and scientists are working together to develop a risk framework aimed at identifying basic data and risk assessment methods of specific nanomaterials (Project VROM/RIVM/VNCI).

(b) *Nano SMEs FAQ* project: a consultation service where entrepreneurs can ask questions about potential risks. RIVM and TNO act as scientific consultants to back up this project to formulate an opinion and provide advice on risks of specific nanomaterials and applications based on existing knowledge. The project also promotes rapid exchange of information between companies and between companies and government.

3) To encourage active communication on risk management:

In order to encourage entrepreneurs to actively communicate how to deal with the risks of nanomaterials, action plans have been made to promote use of codes of conduct as a tool to demonstrate risk management and to use Safety Data Sheets (MSDSs) as a tool to request and communicate safety information along the supply chain.

In November 2009 VNO-NCW and the Dutch Cosmetics Association (Nederlandse Cosmetica Vereniging, NVC) convened a meeting⁹ for an explorative dialogue on nanotechnologies between representatives of various companies, industry organisations, research institutions, Ministries and CSOs (including Consumentbond (Consumer Association), Stichting Natuur en Milieu (Foundation for Nature and the Environment), Vereniging Leefmilieu (Environmental Association) and Women in Europe for a Common Future (WECF).

VNO-NCW is also actively offering support to the **NanoHouse** project - a project that support over 100 SMEs from Belgium, Netherlands and Germany to network for new business models and communication of safety information. Currently this project is only running in South Holland on a rather small scale. VNO-NCW is helping to strengthen the strategies for this project to build stronger links between R&D institutes and companies for new business models that incorporate and facilitate sharing of expertise on safety and communication matters.

Other targets that have been identified in order to facilitate self-regulation and promote responsible innovation include:

- Increase understanding and keep track on what is happening in nanotechnology in The Netherlands
- Raise awareness of companies about potential risks of nanomaterials and ways to use the precautionary principle.
- Support businesses partners to appropriately inform each other and consumers about the presence of nanomaterials.
- Increase awareness of R & D institutes on possible risks.

Various action plans have been made for each of the targets such as communication programmes for R&D institutes and entrepreneurs to raise awareness and sharing of information on potential risks of nanotechnology along supply chain.

2.3.1.3 Dutch academia research scientists' implementation efforts

The following implementation efforts by the Dutch academic research community have been identified through the interview survey:

- The Royal Netherlands Academy of Arts and Sciences (Koninklijke Nederlandse Akademie van Wetenschappen, KNAW) has been working together with the Ministry of Education, Culture and Science in promoting awareness of scientific integrity amongst university research scientists.
- The programme leaders of the Dutch Nanotechnology Initiative have been actively involved in the discussion with the funding authorities on funding strategies for risk research, including suggesting prioritising research on risk assessment methodologies, inclusion of chapters on safety aspects in PhD theses and a possible platform for experience sharing amongst young researchers with regard to the implementation of the EC CoC.

⁹ NVO-NCW & NCV, Cosmetica & Nanotechnologie, November 2009, accessed at <http://www.beautyjournaal.nl/wp-content/uploads/2010/02/cosmetica-nanotechnologie-debat-nederland-november-2009.pdf> in April 2010.

- Dutch universities have initiated activities to promote awareness of potential risks involved in working with nanoparticles amongst young researchers. Delft University of Technology (TU Delft) has taken the lead in publishing safety guidelines to ensure safety handling of nanomaterials at work environment¹⁰. These guidelines have been recently updated to include application of the cutting-edge technology product AERASENSE[®], a portable nanoparticle monitoring device patented by Philips Research, for which the original concepts were first developed by a research team at TU Delft. The leading Dutch public research funding agency on fundamental scientific research, TNO, has also organised a project investigating safety guidelines and practices that are currently in place in Dutch universities.

2.3.1.4 Dutch CSOs' response

1) Comments on implementation measures of the EC CoC:

Communication: Transparency and access

For communication of N&N research and applications and their potential effects on production and distribution chains, transparency and access for a broad public and stakeholders are considered crucial by all CSOs. Views are however divergent on how to communicate and to whom. While the labour union feels that it is useless to inform continuously a public that is not interested, the Christian, women and anti-vivisection organisations point to the importance of providing information actively to the public and stakeholders because without information there can be no serious discussions. Yet, they also acknowledge that in practice it is very hard to engage the general public in discussions about technology-related issues, including research agendas and priorities. According to a few environmental and women organisations, engagement of CSOs (that represent parts of the public) could be fostered by empowering them to develop their own views and policy proposals.

For issues such as respecting fundamental human rights, safety for humans, animals and the environment, the application of the precautionary principle, liability and oversight, all CSOs urge that N&N researchers should comply with existing regulations or principles. For example, in the case of research of N&N for medical applications, existing ethical principles like 'prior informed consent' and 'the inviolability of the human body' should be followed according to environmental, women and peace and development organisations. The anti-vivisection organisations comments that testing animals do not yet have fundamental rights. Nonetheless, most CSOs feel that the N&N CoC could provide a framework for discussions between researchers, stakeholders and the general public.

Risks to be regulated

All CSOs express concerns about possible risks for workers, consumers and the environment involved in N&N research and applications and argue that these risks should be strictly regulated by adapting existing regulations (for cosmetics, novel foods, chemicals, etc.) or adopting new regulations. No CoC should

¹⁰ TU Delft Nanosafety Guidelines, available at <https://intranet.tudelft.nl/live/pagina.jsp?id=de925f04-cb2c-4a1f-ab23-233549af5504&lang=nl>

replace legally binding regulations, also with a view to governmental oversight and liability issues. In this context, the anti-vivisection organisation would like to see a more critical assessment of the need and the type of animal testing models and the availability of alternative testing models.

Precautionary principle

Most CSOs think that the precautionary principle should be applied but their views differ slightly on how it should be applied. In the view of the women's organisation, the precautionary principle should apply to all products and services that contain nano-particles; in case of doubt about their safety, nano-particles should be banned, especially in products for vulnerable groups such as children, and if there is no need for them or if there are alternatives.

2) Comments on Dutch government's implementation efforts

Nano Reference Value

Labour union is of the view of supporting the efforts to develop Nano Reference Values. *"Nano Reference Values are based on the application of the precautionary principle and depend on the type of nano-particles and their analogy with other substances, like for instance asbestos or fine-dust particles. If a Nano Reference Value is exceeded, an extensive risk analysis has to be done and measures must be taken to minimise exposure."* (CSO representative) However, an environmental organization pointed out that the Nano Reference Values established by the SER are only with a view to workers' safety. *"Similar Nano Reference Values should therefore be immediately developed with a view to protect consumers and the environment."* (CSO representative)

Compliance of the CoC as funding requirement

While not all CSOs were aware of this intention prior to the interview, they all show (some) support to this government initiative. Though, the women's organisation warns that a N&N CoC for fundamental research might lead research to inflate claims about possible benefits which could raise false expectations among the public. The labour union, environmental and peace and development organisations hope that it helps publicly funded N&N researchers to be transparent and reflect on their accountability for the possible societal and ethical consequences of their work. One environmental organisation suggests that the reports on this N&N research should not only present the research results but also justify how the researchers have complied with the N&N CoC. The peace and development organisations also argue that it could help to have a societal check of a N&N research project but expect that in practice it will be difficult to enforce.

One environmental group made the comments that CSOs were not given opportunities to contribute to the formulation of research agenda. *"The civil society shouldn't only be involved at the end of pipe when it comes to risks and when risks have been limited to nanoparticles at the process; an ongoing process, an ongoing discussion with stakeholders, a process in which society is part of the innovation from the start"*

should be established, which is not the case at the present time.” (CSO representative)

Nanopodium

As already noted, an environmental organisation criticised NanoPodium as being ‘*mawkish and fluffy*’. “*The coordinator insisted that there should only be dialogue, not debate, thus possible risks should not be a subject of the debate/dialogue within NanoPodium.*” The risk aspect of nanotechnologies is therefore considered as not being properly addressed in this government initiative.

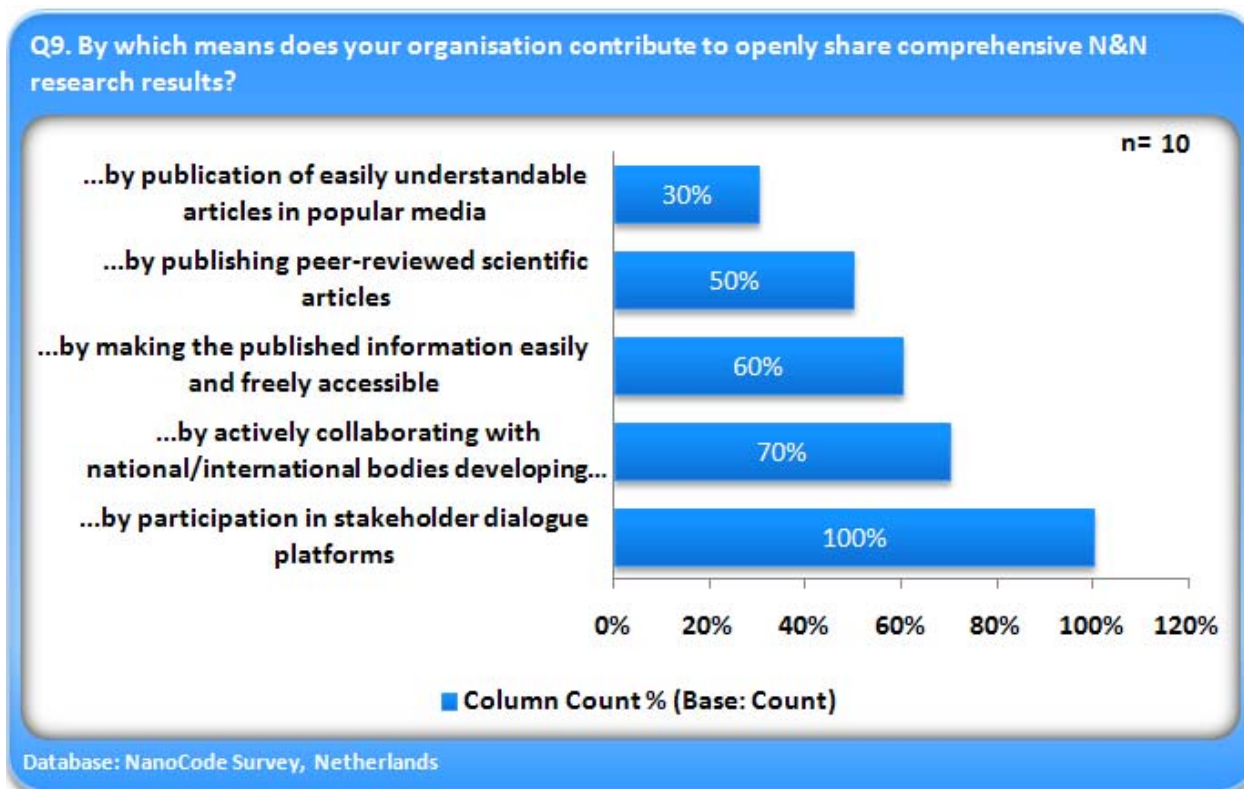
Another health and environmental group pointed out that one of the drawbacks of the current Dutch Nanopodium communication programme is that “*The social scientists involved in organising such programmes are not very aware of the way in which NGOs work.*” “*Environmental CSOs need funding and a well structured framework so they can organise discussion and work together to form opinion. They also need such funding and framework to work with environmental scientists to conduct research to keep their opinions well based.*” Funding support to facilitate such a framework to encourage cooperation between the CSOs and between CSOs and environmental science experts was considered to be missing in the Nanopodium programme.

The same group also pointed out that due to the shadow of the GMO debates, Dutch policy makers seem to hold the idea that dialogue with CSOs should focus on big NGOs such as Greenpeace and Friends of the Earth, and are of the viewpoint that if a big NGO is willing to take the issue up, it will trickle down to the whole society. But the reality is not like this. The big NGOs do not consider nanotechnology as a strategically good topic for campaigns in relation to both visibility and funding. Therefore there is lack of interest in taking the issues up. “*Also nowadays the big NGOs are working in a way very similar to the environmental departments of Government ministries and local councils; they are experts who work from 9 to 5 with packed agendas. They have their hands full, their agenda defined and territories set, therefore, very little room for new issues and creativity. On the contrary, small NGOs have their own networks, and are full of drive to make changes. However, they need a framework to help them to work together to form opinions and influence public opinions. The reality in society is that the people who need the most support are often also the ones that have least resources and skill to organise themselves for political campaigns. The Government should understand and encourage the dynamics of CSOs and facilitate involvement of NGOs in more creative and structured ways.*” (CSO representative)

One interviewee commented that for certain traditional and well structured civil organisations such as religious groups, it takes a longer time for them to incorporate the issues in their annual agenda. The current Government communication scheme has a time-span of two years. “*There is not enough time for such CSOs to even just put the subject on their agenda to be discussed as to whether they as an organisation would like to take part in the debate, not to mention getting workable proposals organised and carried out with such short notice.*”(Independent consultancy)

2.3.2 Information sharing

The questionnaire survey showed that organisations contribute to share N&N results (Q9) mostly through actively collaborating with national and international bodies developing tools for N&N risk assessment, metrology and standardisation (70%, n=10) and through participation in stakeholder dialogue (100%).



The interview survey shows that at least three different models have been developed and used by the Dutch government and industry to promote openly share comprehensive N&N research results:

1) The model of “the trusted third party”: In the “Knowledge Sharing” project, RIVM with its expertise in toxicology and reputation as a trustworthy public research institution acts as the trusted third party with whom the companies share sensitive risk data and support the development of a common risk framework for identifying basic data and risk assessment methods relevant to specific nanomaterials. The concept of “the trusted third party” is also supported by the Netherlands Standardisation Institute (Nederlands Normalisatie-instituut, NEN) as an effective method to facilitate sharing of sensitive safety data.

2) Safety through new business model: A new way of business networking that incorporates and facilitates sharing and development of safety data is under experimentation through the *NanoHouse* project. Effective sharing and cooperation on the development of safety data was hoped to become an added value of such a new business model.

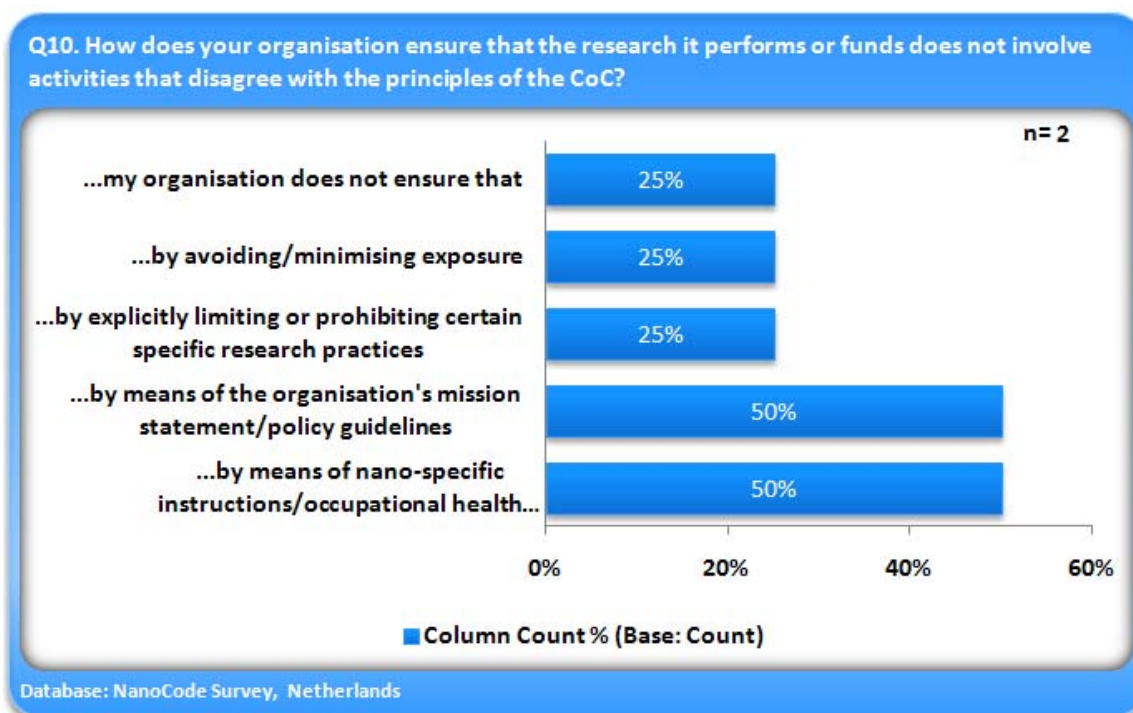
3) Knowledge centre and FAQ services: The Risks of Nanotechnology Knowledge and Information Centre (KIR-nano), an observatory and an advisory body to the central Government on risks related to nanotechnologies, were set up in RIVM on 1 January 2008 with funding from the Ministries of Housing, Spatial Planning and the Environment (VROM), of Health, Welfare and Sport (VWS) and of Social Affairs and

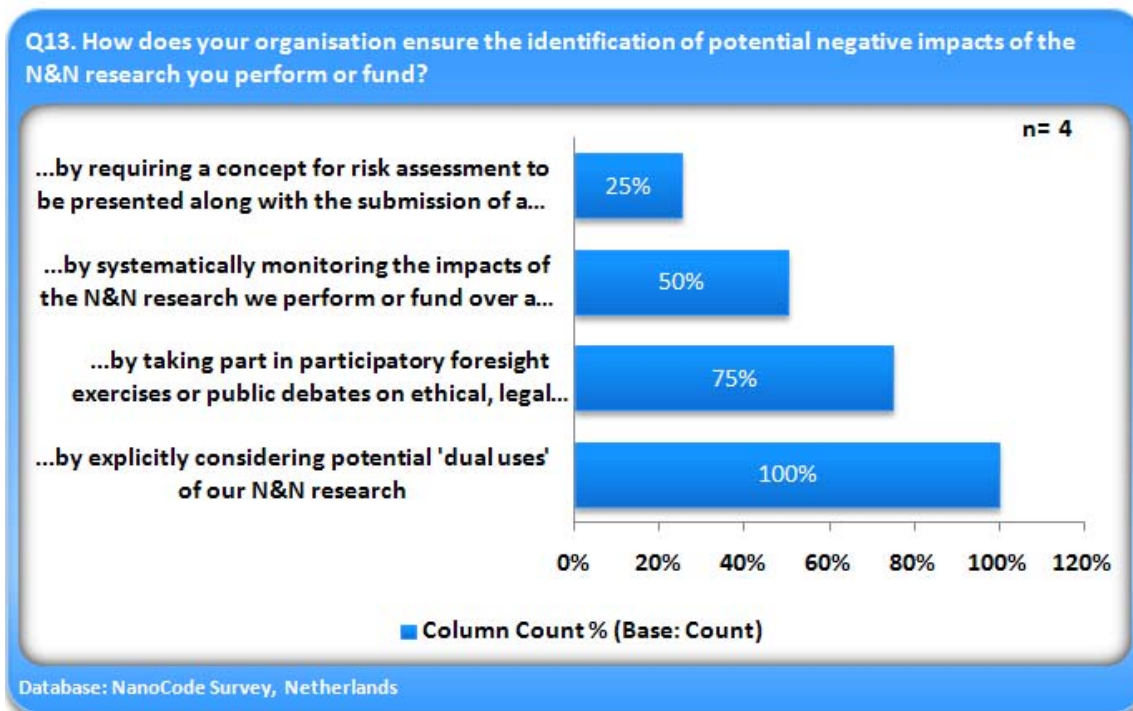
Employment (SZW). KIR-nano collect information on risks related to nanotechnologies and publish reports that are accessible to the general public. In the *Nano SMEs FAQ* project, RIVM and TNO act as scientific consultants who receive questions from entrepreneurs concerning potential risks from the nanomaterials they use and respond with an opinion based on existing knowledge on potential risks that may be involved with regard to specific nanomaterials and applications. This project was considered to have promoted rapid exchange of information between businesses and between business and government.

2.3.3 Monitoring of compliance

Only two questionnaire respondents answered the question “How does your organisation ensure that the research it performs or funds does not involve activities that disagree with the principles of the CoC?” (Q10) and only four respondents answered the question “How does your organisation ensure the identification of potential negative impacts of the N&N research you perform or fund?” (Q13). The reason is that most of the respondents do not perform or fund N&N research and the young researcher scientist respondents are not informed about such matters. “I have no idea.” (University scientist) Two respondents ticked “Others” for Q10 and indicate different approaches:

- “We try to perform our science carefully, and with regard for safety in general. We apply common sense to our research activities, weighing risks and benefits accordingly. Obviously we comply with all rules, regulations and laws, e.g. with respect to use of GMOs etc. Do we follow the CoC? No. It's rather invisible.” (University scientist)
- “Our focus is on safety aspects of nondegradable/insoluble nanomaterials. Research projects are prioritised by what risk assessors regard as pivotal information and are designed in close collaboration with risk assessors. Moreover, topics like alternatives to animal testing are actively addressed in this approach.” (Public research institution representative)





1) Monitoring through contractual control

Interviews show that the Dutch funding agency is planning to monitor the compliance of CoC through its normal contract control procedure, i.e. reporting. The Ministry will be monitoring the whole programme carefully to see if the recipients deliver what they have promised to deliver, not only on the research but also on the ethical side and risk research will be heavily monitored including with regard to the CoC. *“If you look at the monitoring issue from such big picture, bureaucratic procedures such as ticking boxes that will waste manpower and money are not necessary. You can see how things are doing through reporting and for example through publication etc. There are many different ways of checking whether the programme is going well, for example through periodical reports.”* (Institutional representative)

2) Web-based support for self-monitoring: Stoffenmanager

The Stoffenmanager (www.stoffenmanager.nl) is an internationally accepted Exposure Assessment and Control Banding tool. It is a free-of-charge internet-based instrument developed by Arbo Unie, TNO and BECO with funding from the Ministry of Social Affairs and Employment of The Netherlands. The Stoffenmanager is a generic tool initially developed for SME's to support them in assessing, prioritizing and controlling risks from chemicals at the workplace. It supports companies in performing a risk assessment and controlling exposure by taking proper risk management measures.

The Stoffenmanager is also a European Commission recommended tool that was designed to support downstream users (SMEs, sectors) to comply with the requirements set in REACH. Key elements of this system for use under REACH are:

- User friendly, understandable and transparent output for downstream users;
- Exposure estimates in quantitative numbers;

- General guidance on risk management measures according to the STOP principle is provided;
- Effectiveness of measures can be evaluated;
- Focus on tasks with highest risk;
- Export of data for communication on exposure scenarios can be built in easily;
- Information requirements in line with Annex I of REACH;

With the growing concern on managing the risks of NPs, a special module of Stoffenmanager for nanomaterials (Stoffenmanager Nano) have been developed earlier in 2010. Stoffenmanager normally provide both qualitative (risk prioritising) and quantitative assessments. However, due to the lack of exposure limits for nanomaterials and limited available data at present time, the current version of Stoffenmanager Nano only provides the opportunity to estimate a qualitative risk when working with nanomaterials and advice for users on appropriate control measures to reduce a potential health risk. As the knowledge and governmental efforts in setting exposure limits advances, the subsequent version of Stoffenmanager Nano is expected to achieve the ultimate goal of providing quantitative assessment for nanomaterials in the near future.

2.3.4 Further Challenges and opportunities in the Dutch context

1) Life-Cycle/Waste management

“A coming challenge for the Government is to address the responsibility for appropriate waste management. It is challenging to persuade the industry to have a longer term picture of the future of the technologies and to take responsibility in taking into consideration the impact of the whole life cycle of their products. Companies and research scientists tend to have a “free-rider” attitude waiting for the Government to address and invest on risk issues instead of reflecting on their own responsibilities. It is such an attitude that is worrying.” (Government Ministry official)

2) The impact of societal dialogue on research and the role of research scientists in communication

In the Dutch government’s Action Plan¹¹, risk research and communication of ethical and societal issues (societal dialogue) were planned under different action lines¹². Nanopodium was designed for purely communication, not for research while the national research programme was not expected to organise societal dialogue. The time-span of the Nanopodium project is right in the gap between the old and the new national research programme. Due to such practical difficulties, although the coming new national research programme (FES) has successfully incorporated the risk assessment and societal impact aspects, research on communication and the interdisciplinary link between risk/societal impact research and

¹¹ *Actieplan Nanotechnologie*, House of Representatives, Session Year 2007–2008, 29 338, no. 75

¹² For more information about the design and progress of the Dutch Government Action Plan please see the first Country Report of The Netherlands of this project, available at www.nanopodium.nl/content/NanoCode_Country_Report_NL_Final.pdf

communication is therefore missing. The importance of societal dialogue in the development of research agenda and the research scientists' responsibility in communication that has been repeatedly addressed in the EC CoC is therefore not covered in current Dutch government's implementation efforts.

“There is only a small line in the coming NanoNext programme that is working on communication and PR. This is because when the programme was planned, Nanopodium was just started with a huge budget; therefore the consensus amongst the programme writers was that there was enough money already going into dialogue through Nanopodium, it will be difficult to put in any more money in this new programme. But now the new research programme is just about to start, the Nanopodium is already finishing, with the general budget cut, it will be difficult to put in more money on the communication aspect.” (Government Ministry official)

3) Funding to facilitate networking between Dutch CSOs and cooperation between CSOs and environmental scientists

Like many other European countries, the number of environmental NGOs is declining rapidly in The Netherlands due to financial constraints. There are hundreds of local environmental and consumers groups in The Netherlands depending solely on volunteers because there is only very limited funding available. *“The Dutch Government's 2010 SMOM programme¹³ is about €9 million. The demand for funding is almost three times as large, and I expect that the next government will rigorously cut down on subsidies for CSOs, VROM already being the Department with the smallest annual budget of all the Ministries and in face of the need to cut Government expenses by some €30 billion.”* (Health and environmental CSO)

Current Dutch government's communication efforts focus more on communication to the general public, but not on the dynamics of CSOs. Our in-depth interviews revealed that not only the CSOs but also the industry associations consider it is important that the CSOs will be able to get sufficient support to form networks between themselves and with EHS experts to develop well-informed, organised and constructive opinions. Industry spokespersons suggest that this will significantly improve the quality and efficiency of societal dialogue, especially communication on risk aspect and research priorities of nanotechnologies.

4) Further development of sector specific guidance materials and monitoring schemes

The interview results show that the Dutch Government's plan to implement the EC CoC through the national funding programme is still in a rather early stage. Details of a monitoring scheme are still under discussion. On the other hand, Dutch public research institutes are very willing to take the lead in implementing the European Code of Conduct. However, they also pointed out the challenges to incorporate the European Code of Conduct into current quality control procedures and to set up an auditing procedure to monitor and demonstrate compliance. However, although the development of a general monitoring programme is still in a very early stage, this is not to say that progress has not been made through various existing implementation efforts. In fact, the various guidance materials and indicators that have been gradually developed through various existing projects (e.g. projects on risk

¹³ 'Subsidiereregeling Maatschappelijke Organisaties Milieu' = 'Organizations and Environment Subsidy'

management, information sharing, societal dialogue) should be able to provide invaluable experience and resources for any future attempt to provide supporting guidance and monitoring schemes for the implementation of the EC CoC Principles and Guidelines both at national and international level.

2.4 Communication

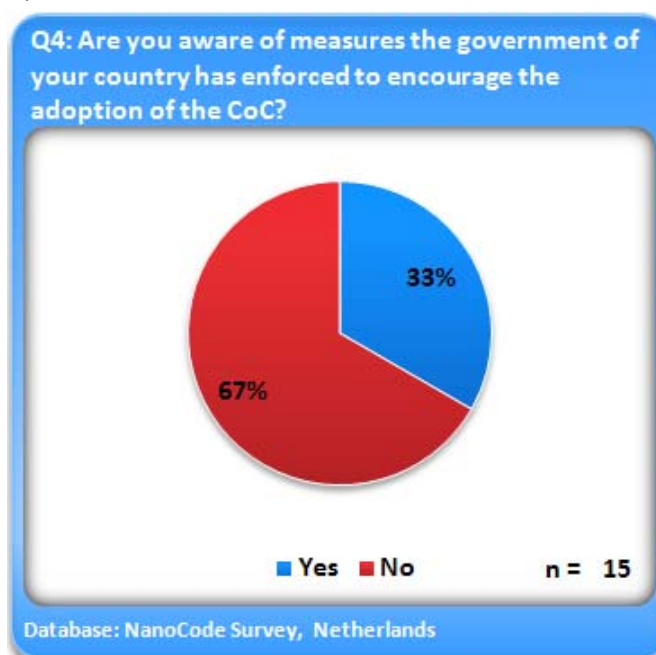
Concerning dissemination activities in The Netherlands, although in the FES fund for nano-innovation research the Dutch government has set compliance of the CoC as a requirement and grounds for stopping the funding by non-compliance, most of the respondents (67%, n=15) are not aware of the measures the Dutch government has enforced to encourage the adoption of the CoC (Q4).

“I haven’t seen any government action into this direction. Though, the government has recently initiated some stakeholder dialogue initiatives” (CSO representative)

“My country is in favor of this Code (how can they not?), but enforceable rules we do not have.” (CSO representative)

“Has not been widely disseminated, if at all.” (University Scientist)

“I have heard comments implying such measures but as I don't work in a nanotech research organisation I have not come across such explicit enforcement of the EC code myself. There are well known other measures to stimulate responsible nanotechnology development in The Netherlands though.” (Environmental consultant)

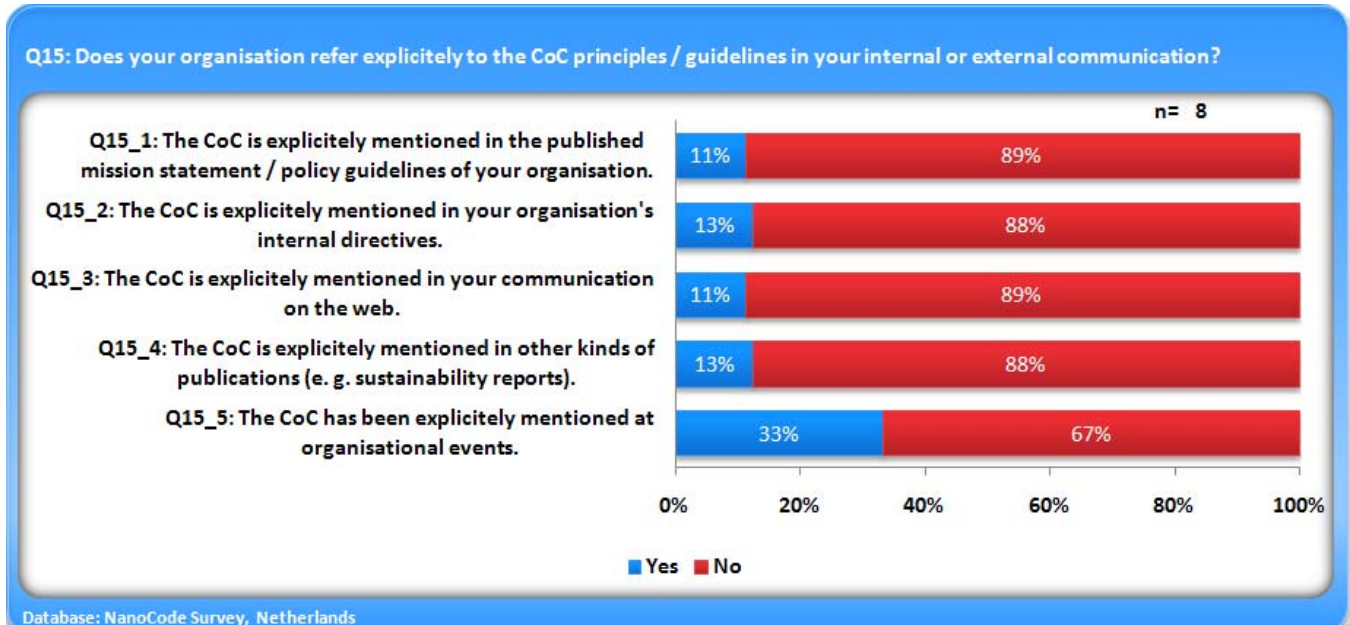


While the Ministry of Education, Culture and Science, The Royal Netherlands Academy of Arts and Sciences, and the Dutch Nanotechnology Initiative (NNI) are currently responsible for dissemination of the CoC, most respondents reported that they do not know who is, or will be, responsible in The Netherlands for awareness raising in respect to the CoC/issues of responsible N&N research in general (Q16_1). The following organisations have been considered by the respondents as (possible) responsible bodies for awareness raising of responsible N&N research:

- CSOs
- Nanopodium
- Consortium performing the national research programme on nanotechnology
- University board
- Funding agencies such as NWO
- Agentschap NL
- Ministry of Economic Affairs
- Ministry of Education, Culture and Science

- Royal Netherlands Academy of Arts and Sciences
- FOM/STW(Nano-Ned)

At the organisational level, most (67-89%, n=8) respondents do not refer to the CoC principles/guidelines in their communication plan (**Q15**).



Apart from those who are in charge of the general performance of their organisation, most respondents either left this question blank or indicated that they do not know who is, or will be, responsible for the monitoring of the CoC in their organisation (**Q20_2**). Since there is only very limited direct implementation of the CoC (if any) so far in The Netherlands at the organisational level, it is not surprising that the survey result to this question is negative.

With regard to personal involvement, around half of the respondents (44-47%, n=16) have either been contacted directly by the European Commission (or related bodies) to take part in the debates of the CoC (**Q14_1**) or have taken part in the European Commission CoC consultation process. 87% of the respondents have not been contacted directly by the Dutch government to take part in the debate about the CoC (**Q14_2**); this is largely because the Dutch government has not organised much discussion about the CoC so far.

3. Recommendations from the survey participants

The following section identifies (recurring) themes and comments which have been brought forward by the survey and focus group participants. These suggestions will be aggregated to country-specific recommendations, where a common trend is identifiable, and be put into the context of the planned activities of the NanoCode project (CodeMeter, MasterPlan).

3.1 Improvement of awareness and dissemination

The questionnaire survey shows that support for the dissemination of the CoC would be appreciated (**Q17**). 60 % of the respondents indicate that they need support to disseminate the CoC. From the limited comments received on this question, the Dutch government agencies indicate that it is always welcome to have support and help. One young researcher commented that his employer needs to give him time to read and understand the CoC.

Questionnaire survey respondents (**Q18**) and interviewees have suggested the following methods that can be used to improve the awareness and dissemination of the CoC:

(1) At European level

- To better embed the European Code of Conduct in the FP7 programme to improve its visibility and to clarify its policy role. (Environmental consultant)

(2) At national level

- A platform with pilot project should be organised and funded to facilitate discussion and exchange of experience between the researchers concerning compliance with the European Code of Conduct. (Researcher)
- Strategic workshops for implementation between the coordinators of relevant research programmes (Public research institution representative)
- Specify each stakeholders' responsibility (Researcher)
- Organize national workshops (Researcher)
- Get it out of the hands of the government that has no interest in genuine public dialogues/debates but only seeks to pacify because of its fear for confrontation with other views (CSO representative)

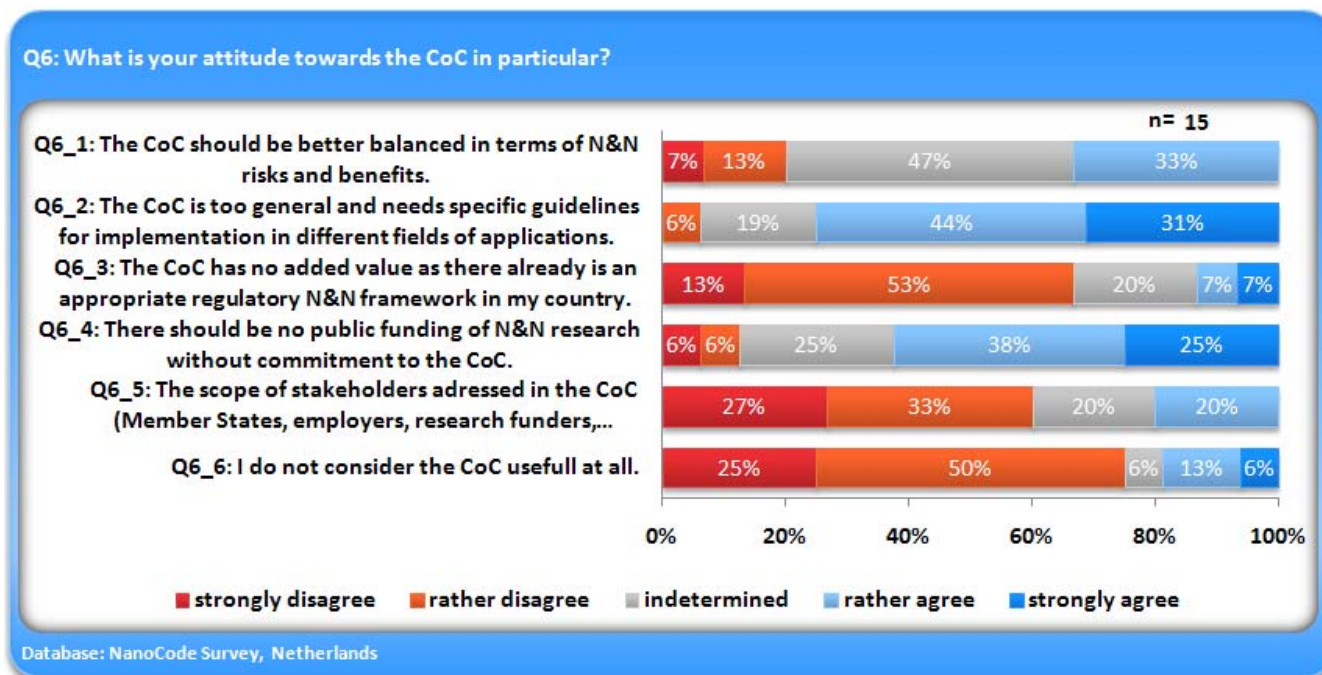
(3) At organisational level

- Companies have already tried to incorporate the CoC into their quality assurance programme and through that there will be business pressure throughout the supply chain that will help to bring the awareness of the code. (Industry association)
- It is invisible. Students in N&N need to know about it. Workers in N&N need to know about it. Road shows, perhaps. (Researcher)
- I suggest the following measures: - Since the CoC is related to safety in the lab, the safety officer can have the responsibility of converting the CoC into rules which are easy to follow by everybody. Following the rules can then be achieved by a shared group responsibility. The group leader can demand this from the employees. (Researcher)

3.2 Scope and revision of the CoC

Scope of the CoC

Most of the survey respondents (75%) regard the CoC as useful and well balanced in terms of N&N risks and benefits (Q6-1. Q6-6). However, most of the survey respondents (75%) also indicate that the CoC is too general and needs specific guidelines for implementation in different fields of application (Q6-2).



The majority of survey respondents (63%, 88% if indifferent are included, n=15) consider it is a good idea to make compliance with the CoC a compulsory condition for public funding (Q6_4). Survey respondents in general agree that the contents of the CoC itself do not contain elements that will hinder their commitment to the CoC (Q11). However, many made the comments that the CoC being too general might hamper commitment to it (Q12).

Two concerns over the scope of the CoC have been especially pointed out by the survey respondents as very worrisome:

(1) The need to differentiate between nanomaterials:

When the safety aspect is concerned, differentiation should be made between embedded nanostructures, nanostructures, nanostructured materials and nanomaterials. *“The current European Code of Conduct’s ‘one-size-fits-all’ approach will have no effect on the target groups, and will instead have negative impact on risk communication and nanotechnology innovation.”* (Research scientist)

(2) Section 4.1.17 is too broad and vague:

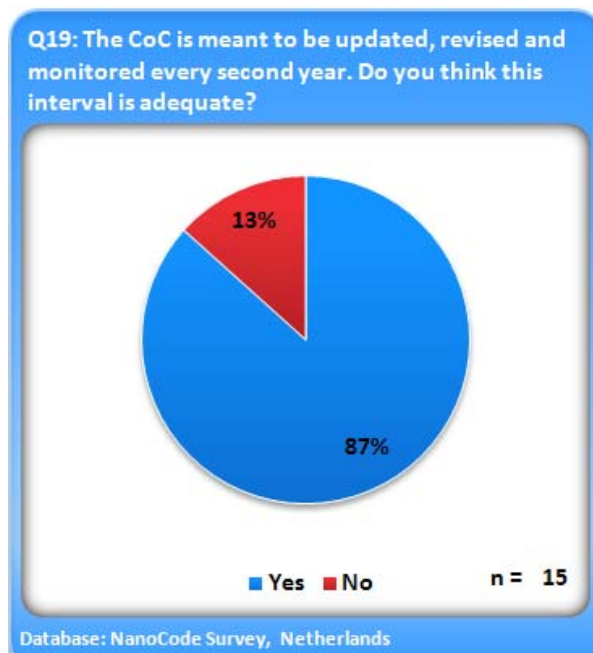
The wording of the 4.1.17 is too broad. Strict implementation of Section 4.1.17 will lead to a moratorium on certain types of research in nanomedicine, nanofood and nano-enabled personal care products. The Commission should seek methods to further specify the targeted instances, for example, differentiate between naturally occurring nanoparticles and man-made nanoparticles.'

Revision of the CoC

Regarding the opinions about the two year interval for the revision of the CoC, the majority (87%, n=15) of the questionnaire respondents consider it is adequate. However, interview results show that most of the interviewees think a two year interval is too short and not practical, as has also been shown by delay in delivering the first revision.

“Two years is too short, researchers need time to get familiar with it and to prepare proposals.”
(Government Ministry official)

“ It is not a good idea to change the contents too often, companies will be very annoyed if they have to spend time to study and change policies all the time. Every two years is too much, there is not enough time for the companies along the supply chain to communicate and adapt to it” (Business representative)



3.3 Teeth/Monitoring

The following recommendations have been made by the survey participants regarding possible methods of monitoring compliance and providing teeth to the CoC:

From researchers

- To use pressure of the University Board on research institutes as a driving force for compliance (Researcher)
- To introduce legal duty of compliance (Researcher)
- To set up an auditing procedure to monitor and ensure compliance (Researcher)

From government agencies

- To introduce contractual obligations in public funding scheme with potential threat of stop funding if

not compliance (Government Ministry official)

From Industry

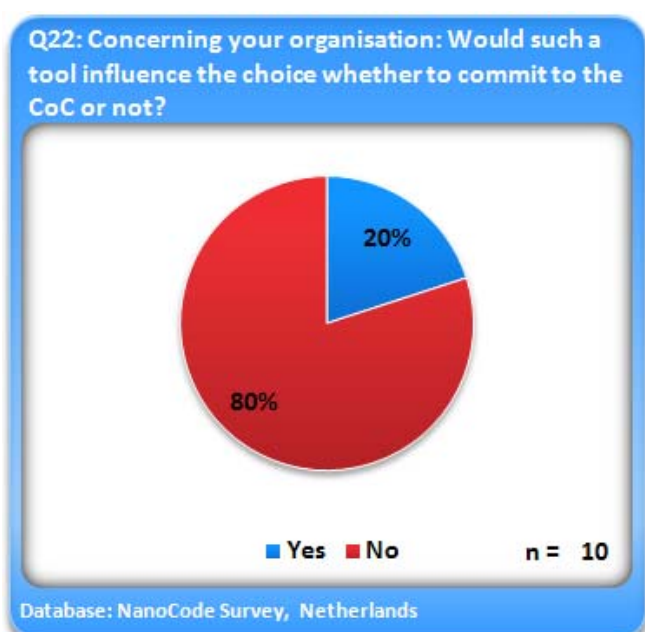
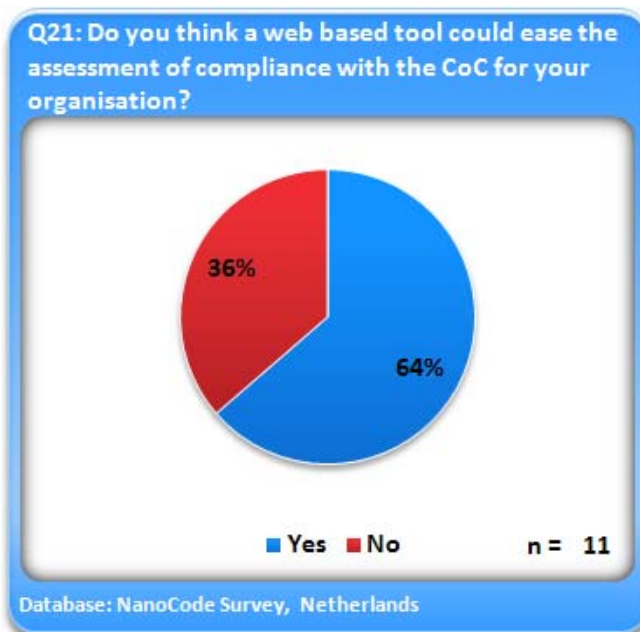
- Use pressure from the supply chain (e.g. business opportunities) as a driving force to ensure compliance (Industry representative)

From CSOs

- To ensure CSOs involvement (CSO representative)
- To develop and implement N&N CoCs that are tailor-made for specific (clusters of) companies and negotiate for agreement with the company and monitoring from the CSOs (CSO representative)
- Through permanent interaction between research institutions and companies involved with compulsory reporting as a tool to force research institutes and companies to keep ethical issues on the agenda and to reflect on what they are doing (CSO representative)

3.4 Web based tools

With regard to web based tools, many of the survey participants (64%, n=11) consider it could ease the assessment of compliance (Q21). However, the majority (80%, n=10) of the respondents indicated that such a tool would not have influence on their choice regarding whether to commit to the CoC or not(Q22).



3.5 Other incentives

When asked whether they can think of any possible incentives to support a broader implementation of the CoC principles and guidelines in their organisation (**Q23_3**), the respondents made the following recommendations:

- To introduce “positive labels” as reputational incentives through publishing lists of research institutions/researchers who have complied with the CoC principles and guidelines. (Researcher)
- Research centres often have good contacts and working relationships with big companies in terms of scientific endeavour. It might be useful to strengthen such connections by promoting the cooperation between the big companies and the research centres on safety matters, especially in life-cycle analysis. (Business representative))
- Encouragement might be more important than punishment at the individual level. (Researcher)
- If the employer thinks the CoC is important, he will influence the group members to feel the same way. (Researcher)
- Make it a part of student training. (Researcher)
- Make it part of our quality control system in internal audits (Researcher)
- Management make specific guidelines or rules according to relevant items in the CoC. (Business representative))
- Request the organisations as the main authors of the CoC, because they definitely know best about lab reality. (Researcher)
- Organising workshop. (Researcher)

4 Conclusions: The CoC as a tool for responsible development of nanotechnologies research

Role and content of the EC CoC

The general awareness of the existence of the EC CoC is high amongst the major players in nanotechnologies in The Netherlands. However, results from in-depth interviews show that many stakeholders, though being aware of the existence of the CoC, are not familiar with its contents and have only very limited knowledge regarding its current status. Awareness amongst young researchers and SMEs is relatively low. The Principles and Guidelines outlined in the EC CoC are largely supported by the survey respondents. Few comments were received on the principles of “meaning” and “precaution” due to the concerns about the condition of public comprehensibility. Several researchers voiced their concerns about the Principle of “Accountability” and Guideline 4.1.17 for their implementation may bring unfair burden on researchers and hinder research in certain areas.

Most survey respondents regard the EC CoC as a relevant and useful tool to facilitate awareness and systematic communication for responsible N&N research; however, they also consider that further incentives/teeth and guidance are needed for effective implementation. All survey participants agree that the EC CoC should be routinely revised; nevertheless, most consider a two-year time-span too short for the targeted groups to prepare relevant proposals and procedures that are needed for implementation.

Compliance and commitment

The Principles and Guidelines of the EC CoC have been largely followed and further implemented in various Dutch initiatives on responsible N&N research. The Netherlands is the first European Member State that has introduced the mandatory contractual obligation to comply with the European Code of Conduct in its national funding schemes for N&N R&D. Coordinated research on risk and other societal impacts of nanotechnologies aiming at raising awareness and advance knowledge for regulatory purpose has been incorporated in the national funding programme. A platform for unbiased societal dialogue has also been set-up to endorse the Principles of inclusiveness and transparency. For work safety, the Precautionary Principle has been gradually implemented through various joint projects between public/private research institutions and the industry including, for example, by “*Nano reference value for nanoparticles*”, “*Handbook - working with nanomaterials*”, “*Nano SMEs FAQ*” and “*NanoHouse*”. At least three different models have been developed and trialled in The Netherlands to encourage and facilitate information and knowledge sharing. Apart from monitoring compliance to the EC CoC through routine contractual control of funding execution, a web-based tool to support SMEs on risk management and regulatory compliance, the Stoffenmanager Nano, has also been developed to support self-monitoring.

Challenges remain in the Dutch context, including for example:

- (1) general attitude toward responsibility on life-cycle/waste management
- (2) linkage missing between research and communication programme, especially with regards to the role of societal dialogue in the development of research agenda and researchers' role in communication
- (3) Funding strategies to facilitate networking between Dutch CSOs and cooperation between CSOs and environmental scientists
- (4) Further development of sector specific guidance materials and monitoring schemes. However, the guidance materials and indicators that have been gradually developed through various existing projects (e.g. projects on risk management, information sharing, societal dialogue) should provide invaluable experience and insights as resources to support further development of strategies and guidance for the implementation of the EC CoC (Principles and Guidelines) both at national and international level.

Communication and dissemination

The communication and dissemination of the EC CoC is limited in The Netherlands. Given the commitment from various public and private initiatives to the Principles and Guidelines, most survey respondents reported that they do not know exactly who is, or will be, responsible for the implementation of the EC CoC (Principles/Guidelines) both at national level and organisational level. In order to improve dissemination and communication of the EC CoC, survey participants have suggested that the policy role of the EC CoC should be further clarified and better embedded in the FP7 programme. They also recommended that activities such as national workshops, students' platform for experience exchange, and strategic meetings on the implementation of the EC CoC with programme coordinators should be organised to facilitate dissemination and experience sharing.