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**Open-ended Working Group of the International Conference  
on Chemicals Management**

**Second meeting**

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Item 5 (a) (iv) of the provisional agenda\*

**Emerging policy issues and other issues of concern:  
report on progress on emerging policy issues:  
nanotechnologies and manufactured nanomaterials**

## **Report on progress on nanotechnology and manufactured nanomaterials**

### **Note by the secretariat**

1. The secretariat has the honour to circulate, for the information of participants, a report received from the United Nations Institute for Training and Research (UNITAR) outlining activities related to nanotechnology and manufactured nanomaterials undertaken in the context of the Strategic Approach to International Chemicals Management (see annex).
2. The report provides an overview of the nanotechnology-related activities of UNITAR and the Organization for Economic Cooperation and Development together with a summary of actions in relation to the 13 activities pertaining to the environmentally sound management of nanotechnologies and manufactured nanomaterials set out in the Global Plan of Action of the Strategic Approach.
3. Strategic Approach stakeholders are invited to provide feedback and input on the Strategic Approach activities related to nanotechnology and manufactured nanomaterials. Comments should be submitted by e-mail to SAICM@chemicals.unep.org by 6 February 2015. The secretariat will relay such comments to UNITAR for consideration in the further development of activities on nanotechnology and manufactured nanomaterials in the context of the Strategic Approach.
4. The report is reproduced as received by the secretariat, without formal editing.

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\* SAICM/OEWG.2/1.

## Annex

# Report on progress on nanotechnology and manufactured nanomaterials

## Introduction

Nanotechnology - or “nano” - is considered a key emerging issue under the Strategic Approach to International Chemicals Management (SAICM), with UNITAR and OECD as the lead international agencies addressing this topic. Nano is a growing industry which creates an array of economic and social benefits, while potential risks to human health and the environment are, to-date, not fully known. As a result numerous nano-containing products are placed on the market, creating the need to prepare appropriate regulations and safety standards.

Further to the decision of ICCM-2, the June 2009 Joint Meeting of the OECD instructed UNITAR, in cooperation with the OECD Secretariat, to undertake awareness raising and other related activities in developing countries regarding the potential risks (e.g. to the environment or human health) and benefits (e.g. decreased costs of low-maintenance products, or use in environmental remediation) of nanotechnology and nanomaterials. In response to this resolution, UNITAR’s objective was to raise awareness on the topic of nanotechnology in countries, as well as to consider the implications for developing and transition countries with regard to nano-based and nano-containing products being traded across borders, into jurisdictions where there is little or no capacity to address them.

To address these global challenges, nano has now been included as a key topic under SAICM. The ICCM3 resolution III/2 E on nanotechnologies and manufactured nanomaterials: encourages all stakeholders to facilitate the exchange of information in order to improve global transparency and to allow for better decision-making processes; invites relevant international organizations, such as UNITAR and OECD, to continue to facilitate information exchange, develop guidance and training materials, and support public dialogue; and recommends that further pilot projects be developed at the national level to enhance stakeholder capacity for the sound management of nanotechnologies and manufactured nanomaterials. In addition, 13 proposed activities have been included in SAICM’s Global Plan of Action (GPA).

Working within the framework of the Inter-Organization Programme for the Sound Management of Chemicals (IOMC), UNITAR has implemented since 2009 a range of activities to support developing countries. Core funding for these activities has generously been provided by the Government of Switzerland.

**Regional Activities** – From 2009 to 2011, UNITAR organized 9 regional workshops on nano for the African, Arab, Asia-Pacific, Central and Eastern European, Latin America and Caribbean regions. More than 500 experts participated in these events, representing stakeholders from government, industry, and civil society. The main aim of the first round of workshops involving government, industry and civil society representatives was to raise awareness on nanotechnology - its current and potential applications and the possible human health and environmental safety implications associated with the use of nanomaterials.

Due to the success of these workshops, countries requested a second round of workshops, which commenced in early 2011. The second round of workshops included further details of country situations regarding nano, as well consideration of the proposal to include nano in the SAICM GPA, which was subsequently accomplished at ICCM-3 in 2012. The workshops focused on developing consensus on new nano work areas and activities to be included in GPA, and prepared participants for negotiations at ICCM3 held in September 2012.

As a “new” issue in the international discussions on chemicals management, many countries and stakeholders had low awareness and understanding of this important new field and thus through a series of two “rounds” of regional workshops, the project encouraged dialogue, information sharing, and discussion of regional priorities on nano. In order to ensure a close link to the overarching SAICM discussions (e.g. on emerging policy issues such as nano and the proposals to include nano in SAICM’s GPA), almost all the regional workshops were held back-to-back with the general SAICM regional meetings. This allowed both for the results of the nano discussions to feed directly in to the broader regional SAICM deliberations, as well as for cost sharing between UNITAR and the SAICM Secretariat (UNEP) for the participants to both events.

**UNITED NATIONS INSTITUTE FOR TRAINING AND RESEARCH (UNITAR) ACTIVITIES**

**National Activities** – In 2011, UNITAR began a series of national nano pilot projects for developing countries. The projects have focused on integrating nano-related safety management into existing national programmes for the sound management of chemicals, and on strengthening technical and institutional capacities to address challenges in line with Chapter 19 of Agenda 21 and the Strategic Approach to International Chemicals Management (SAICM).

Phase 1 pilot country selection was undertaken jointly by UNITAR and the Government of Switzerland with a view in maintaining a regional balance as well as including a combination of countries that have some experience with nano issues (e.g. Thailand) and those with less (e.g. Nigeria, Uruguay). The countries conducted a national nano assessment (similar to a National Chemicals Profile), set priorities, and developed elements of a national nano-safety policy involving all relevant stakeholders. Initial results and lessons learned from phase 1 pilot projects in Nigeria, Thailand, and Uruguay were considered at a well-attended side-event at ICCM3 entitled “Nano as a key SAICM emerging issue for sustainable development: experiences and lessons learned from 3 pilot projects.” The event was attended by over 60 participants, and featured presentations from all 3 pilot countries on their experiences, lessons learned and next steps, as well remarks from the Government of Switzerland and UNITAR.

In late 2013, UNITAR again with the financial support of Switzerland embarked on a phase two nano pilot projects. The countries selected are Armenia for the Central and Eastern European region, Jordan for the Arab region, and Vietnam for Asia-Pacific. The second phase of projects will continue with the activities proposed from phase 1 including:

- Awareness raising with the participation of all stakeholders
- Development of a national “nano assessment”
- Identification of national nano safety priorities
- Developing elements of a national nano safety policy with stakeholders
- Training on nano safety

Experiences from the pilot projects for both phase one and two will be shared with SAICM stakeholders as appropriate at regional meetings, 2<sup>nd</sup> session of the Open-Ended Working Group, and at ICCM-4. Overall lessons learnt have shown that more awareness and policies is needed on the subject as many gaps still remain (please see below under “Inclusion of Nanotechnology into SAICM’s Global Plan of Action”).

**Phase 1 Pilot Projects:**

**Nigeria** – The key outcomes from the nano pilot project, with Nigeria’s Federal Ministry of Environment, were identification of national nano-safety priorities as well as endorsement of a chapter on nanotechnology and nanomaterial concerns, which contains elements of a national nano-safety policy and strategic plan for nano-safety and nano ethics as part of the Nigerian National Profile (Chapter 5 “Nanomaterial Concerns”). Further outcomes were noted as:

- Strengthened national capacities in both public and private sectors on nano safety issues
- Strengthening of networks of stakeholders established for continued cooperation on nano-safety issues (information on nano-safety)
- Identification of gaps and preferred recommendations by stakeholders for implementation (see below)
- The project outputs can now be shared both at the international and national levels.

Areas that need strengthening and recommendations for follow-up in Nigeria included:

- The urgent need for a comprehensive national survey on the status of nanotechnology and manufactured nanomaterials including importation and use of nanoproducts in Nigeria as priority follow-up action to the pilot project.
- Sustaining public awareness through programmes on nano-safety by key stakeholder groups (i.e. active collaboration between Ministries of Environment and Education into educational programmes).
- Development of a legal and institutional framework for the future production of nanomaterials which could include use of “quality marking” of nanoproducts (as practiced by Thailand). This work could be potentially undertaken by the Standards Organization of Nigeria (SON) and the National Agency for Food and Drug

Administration and Control (NAFDAC) with key stakeholders (i.e. strategic nano-safety action Plan on nanoproducts).

- Strict monitoring of importation of nanomaterials through sensitization of appropriate finance/advisory committees and groups on national import/export guidelines and procedures (i.e. possible labeling for nano products similar to the GHS). As a start, an inventory could commence for garment companies already established using nanomaterials in Nigeria.
- Adoption of a lifecycle approach in evaluating environmental, health, and safety aspects of nanotechnology and manufactured nanomaterials.
- Revision and updating of the National Policies on environment and chemicals to include nanotechnology and manufactured nano materials.
- The importance of a standardized framework for Nano-safety capacity building in pilot countries.

**Thailand** – Currently, manufactured nanomaterials in various industries, for instance, textiles, plastics, coating and paint, and cosmetic are used in Thailand. A number of nano-enabled products are commercially made available, including water repellent clothes, antimicrobial coated materials, nano-encapsulated vitamins and nutrition, and nano-emulsion skin care products. During the course of the phase one projects, UNITAR and Thai NANOTEC organized two nano safety workshops. The workshops consisted of state of the art presentations and discussions in working groups about the implementation and further development of the Thai Nanosafety Strategic Plan into the Thai Nanosafety Action Plan. Elements of Thai national coordination consisted of the Nanosafety Roadmap; the National Nanosafety Guidelines for the public; the National Nanosafety & Ethic Strategic Plan; certifying “Nano Q” as a standard nanomark for selected nanoproducts; collaboration with the National Chemical Safety Steering Committee; collaboration with the Working Party on Manufactured Nanomaterials (WPMN) of OECD; and the Sponsorship Programme. Key outcomes are In vitro and In vivo studies, toxicity effects of TiO<sub>2</sub> related to protein level and cell stress, irritation test of nanoTiO<sub>2</sub>-coated masks, and effects of nanoparticles on workers of nanomaterial manufactures. As a result, the Thai Government has recently approved the National Nanotechnology Policy Framework and a five-year “National Nanosafety and Nanoethics Strategic Plan” to ensure sustainable development of nanotechnology. This plan was jointly developed by key all stakeholders and aligned with the current National Chemical Management Plan.

Due to the establishment of the National Nanosafety Strategic Plan, Nano Q, a certified mark for nanoproducts (functional textiles, coating materials, household products), which are certified by the Nanotechnology Association of Thailand, were initiated. Motivations to have Nano Q were to increase public trust; facilitate a healthy development of nanotechnology; consumer protection; avoid wasting funds; protect good companies; eliminate unfair competitions between good and bad products; and, facilitate trade and stimulate economic growth. In order to achieve these goals, the development of standard testing procedures for nano-scale measurement, and nano properties i.e. anti-microbial and water repellent were tested and standardized.

Nanosafety is a sensitive issue and transparent working groups are essential. Realizing that nanotechnology is a new emerging issue, a public awareness program is also needed. Information sharing and database may also be required. In addition, strong commitment of the Government is needed for human resources, infrastructure, and budget. The National Coordinator or the Secretary of the Nanotechnology Development Committee should be autonomous. Timing and coordination between national policy and implementation are crucial. The synergy of R&D, Testing and Standardization Lab, and Policy Research are essential. Key partners from academic, private sectors and government are crucial.

Next steps will look at turning the Nanosafety Strategic Plan into the Action Plan. The Nanosafety Roadmap is a constructive milestone for each partner to visualize and be able to reach the same goal. The Strategic Plan then needs to be linked and integrated to the National Chemical Safety Plan. The Nanosafety Guidelines will be implemented under the voluntary scheme for the first step. The public awareness program on safety will be strengthened. In addition, Thailand will continue to extend the collaboration of the Nanosafety framework to other countries through international organizations i.e. UNITAR, APEC, Asia Nano Forum, and OECD. Furthermore, with the support of UNITAR, Thailand proposed to be a “sub-regional hub in Nanosafety and Nanotechnology” in ASEAN in order to further strengthen collaboration among neighbouring countries, as well as working with developed and developing countries in which risk management and public awareness will be promoted. Thailand is committed in achieving the 2020 goals and firmly believes in moving forward the development of nanotechnology issues in the sub-region and in the global arena.

Based on outputs, seminars, and strategic plans it is clear that Thailand is further advanced in comparison to other countries in the region. However, for Thailand the work of implementation now officially begins. As a result, it will take the period from 2012 to 2016 to implement Thailand's Nanosafety and Ethics Strategic Plan. It is planned that Thailand will specifically share their experience with Vietnam, as part of the Phase II nano project. Continued outcomes are to strengthened collaboration between UNITAR and Southeast Asia Countries and drive nanotechnology as an emerging issue in the Asia Pacific sub-region; and to continue to raise public awareness and promote nanosafety initiative in the sub-region.

**Uruguay** – In 2012, UNITAR signed a memorandum of agreement with the Basel Convention Coordinating Center (BCCC) and the Stockholm Convention Regional Center (SCRC), in conjunction with the Laboratorio Tecnológico del Uruguay (LATU). The nano safety project between UNITAR and Uruguay followed a similar format to both Nigeria and Thailand except that the country focused on creating a nanosafety assessment with a waste management component in order to assess the national situation with respect to the use and management of nano-containing products and residues derived from nanotechnology (nanowaste).

Workshops under this project showed that nanotechnology has or is expected to have a significant impact with experts focusing on medicine, development of pharmaceutical drugs, decontamination of water and soil, production of stronger and lighter materials. The areas highlighted explain why investments from governments and industries have increased with regard to nanotechnology.

Throughout the project, workshops with relevant stakeholders discussed the development of the nano sector and its current state in the country. One academic Centre, The “Interdisciplinary Centre for Nanotechnology and Chemistry and Physics of Materials” (CINQUIFIMA) which is also part of the national University, gathers several national research groups working in the fields of Supramolecular Chemistry and Nanotechnology with regard to the synthesis of precursors, materials and nanomaterials, and the characterization and study of their properties and applications. Other academia presented research undertaken in the country on dye-sensitized solar cells, nanoencapsulation for different applications, and development of nanoparticle-based sensors.

The outcomes of the project resulted in an in-depth report on “Nanoevaluation and Proposal for a Nanosafety Plan” including a nanosafety action plan and nano waste component. It is clear that nanosafety issues have arisen and the use of nanomaterials is an international challenge with Uruguay being no exception. The report is intended to be a useful tool for addressing the safety issues pertaining to nano so it could be included in the health and environment agendas of the relevant organizations. In addition, as it addresses some of the core aspects related to nanosafety, the report is expected to contribute to the development of nanosafety protocols in other Latin American and Caribbean countries.

In terms of next steps for Uruguay, they have noted that greater awareness on the issue is required as at the moment it is mainly falls under Academia and not generally discussed at the public level. It would also be beneficial to establish public dialogue on the subject and to also have a website available with information on nanomaterials' benefits, hazards, potential exposure, and risks.

### ***Phase 2 Pilot Projects:***

**Armenia** – In coordination with UNITAR and the Ministry of Nature Protection of the Republic of Armenia, in September 2014 Armenia held their inception workshop “Awareness Raising for NanoSafety in Armenia” with participants mainly from government agencies and academia. This was the first time that an event on nanosafety took place in Armenia. During initial preparations, it became evident that there are already research activities ongoing on nanomaterials in Armenia, mainly at the Physics Departments of the Armenian Universities.

The Minister of Nature Protection of the Republic of Armenia and the Swiss Ambassador opened the workshop. They mentioned the big economic opportunities for nanomaterials in Armenia, but also potential risks for human health and the environment and the need for international cooperation in this field. Representatives of Armenian Universities in attendance outlined their detailed research activities on nanomaterials. The participants were then able to discuss the applicability of these experiences in Armenia. A press conference followed with representatives of various newspapers and Armenian television stations, which created good coverage in the media.

The project implementation will facilitate human resource development issues regarding nanosafety, as well as strengthening national capacities for chemicals management. Collaboration between UNITAR and the Ministry of Nature Protection of the Republic of Armenia in the framework of the mentioned project will continue the long-standing cooperation established between the two organizations,

especially in such a new area of mutual interest that relates to emerging problems of nanotechnology, nanomaterials and nanosafety.

**Vietnam** – As part of the activities undertaken within the phase two nano pilot projects, UNITAR and the Government of Vietnam (Pollution Control Department, PCD) organized an inception workshop “Awareness Raising for Nanosafety in Vietnam” for participants from various Ministries, industry, NGOs, research organizations and media (television/newspapers). The event took place in Hanoi end of March 2014. In their opening speeches the Swiss Ambassador and the Vietnam Environment Agency (VEA) Deputy Director mentioned the big economic opportunities for nanomaterials in Vietnam, but also potential risks for human health and the environment and the need for international cooperation in this field. After an overview of the policy and regulation regarding the development of nanotechnology and nanomaterials in Vietnam, as well as the current regulations related to nanosafety issues, new policies and further cooperation between UNITAR and Vietnam were discussed. The overall picture of the nanotechnology and nanomaterial research programs, the research institutions and the application of nanotechnology in different areas in Vietnam such as in agriculture, environmental water treatment, and electronic products (LED) were presented. The participants also discussed the current international cooperative activities in the field of nanotechnology in the region, including the eAsia forum, ANF (Asian Nano Forum) and EU FP7. The media representatives showed great interest on aspects of nanomaterials, consumers’ right to know, evidence of impacts of nano, and other environmental health aspects. The media also expressed the long term willingness and commitment to cooperate in order to raise the public awareness on nanosafety.

Government representatives proposed to establish a nano working group with all stakeholders in Vietnam in order to facilitate the work on nanosafety issues. The lessons from this project and of the international community should also be taken into account for development of policy advice for the Government. Scientists suggested that research proposals should be developed and submitted to international research funding agencies (EU, Switzerland) to support nanosafety research in Vietnam. International trading aspects of nano products should also be addressed, including GHS; material safety data sheets MSDS and product labeling.

**Jordan** – In January 2013, a workshop on nanosafety took place in Amman (Jordan), back to back with the final Workshop for the Industrial Chemicals Project under the Rotterdam Convention. The following issues were discussed: background, aim, methodology, expected outcomes, national expectations of the nano project.

A draft nano chapter to be added to the Jordanian National Chemicals Profile was presented. In which it was noted that in Jordan there is considerable interest in the development and production of nanotechnology in universities. Currently, no accurate statistical information is available on the number of industrial facilities that uses nanomaterials in their industries. The recent development of nanomaterials is not well understood or recognized in statistical terms. Currently, there are no rules or legislation in Jordan dealing with nanomaterials, but in principle, these materials can be subjected under the laws and legislation for chemicals.

Jordan still in the initial phases of dealing with nanotechnology, it requires time and infrastructure, as well as technical and financial resources in order to achieve these outcomes. Therefore, it is necessary to encourage studies and research for measuring the severity of nanomaterials on human health and impact to the environment. There must be technical laws that enable all stakeholders to monitor nanomaterials and to ensure their compliance with the Jordanian standards. There is no national umbrella to manage and coordinate national efforts in this area, and Jordan lacks legislation on safe management and handling of nanomaterials.

Under the UNITAR project, Jordan now needs to establish a national umbrella to manage and coordinate national efforts in the field of nanotechnology; amend legislation and laws in line with the development of nanotechnology; launch awareness workshops for technical staff operating in the relevant authorities; set up proper rules that determine the technical specifications of nanomaterials; establish a real database on products containing nanoparticles, and support national capacity to deal with nanotechnology.

**Sub-regional Workshops** – UNITAR in partnership with OECD, funded by the Government of Switzerland, are organizing a series of sub-regional workshops for the Latin America and Caribbean, Asia-Pacific, and Africa regions taking place in 2015. These workshops are aimed towards professionals working nationally or at the regional level in the field of nanotechnology who are able to provide concrete contributions on a technical level to address nanosafety issues, covering such topics as safe testing and risk assessment and occupational, consumer, and environmental exposures of manufactured nanomaterials. Perspectives and experiences from countries, regional experts, international organizations, industry, and non-governmental organizations will also be included.

Outcomes from this workshop will be reported to the 4th International Conference on Chemicals Management (ICCM4) taking place in latter half of 2015.

**E-learning course** – As a way to increase outreach and scale-up accessibility to information about nano issues, UNITAR initiated in 2013 the development of an e-learning course on “Introduction to Nanomaterial Safety” to all interested stakeholders. The course teaches participants about global, national, and sector-specific issues and to assist in developing basic skills for recognizing safety concerns and learning about risk management approaches to manufactured nanomaterials.

Two rounds have taken place: May to June 2014 and October to December 2014. Currently, the course is only offered in English but depending on public interest there may be a possibility to also have the course in Spanish. Participant feedback from both courses has been extremely positive and UNITAR aims to rerun the course in the first quarter of 2015 with the possibility of eventually creating an advanced course to follow this introductory course.

**Training Materials and Resources** – To support country-driven processes on nano, UNITAR has developed a guidance document entitled “Developing a National Nanotechnology Policy and Programme”, available in English, Spanish, and Russian. For national and regional training activities, the Institute is supported by a network of experts from around the world.

### **ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD) ACTIVITIES**

In 2006 OECD established a Working Party on Manufactured Nanomaterials (WPMN) as a subsidiary body of its Chemicals Committee. The objective of the WPMN is to promote international co-operation in human health and environmental safety aspects of manufactured nanomaterials among member countries and non-member economies, civil society organizations, industry and intergovernmental organisations.

The OECD aims at identifying the most appropriate approaches for determining the Safety of Manufactured Nanomaterials. Based on progress achieved since 2006, the WPMN agreed to re-structure the work into four main projects (as opposed to the original nine). They are: i) Testing and Assessment of Manufactured Nanomaterials; ii) Risk Assessment and Regulatory Programmes; iii) Exposure Measurement and Exposure Mitigation; iv) Environmentally Sustainable Use of Manufactured Nanomaterials. Each project is led by a Steering Group comprising experts from OECD delegations, non-OECD member economies, as well as representatives from other IGOs, industry, environmental, NGOs, and Animal welfare associations.

#### **Testing and Assessment of Manufactured Nanomaterials**

In March 2013, the OECD concluded the Sponsorship Programme for the Safety of Manufactured Nanomaterials (hereafter Testing Programme). The Testing Programme aimed at assessing the applicability of existing methodologies for assessing the toxicity of manufactured nanomaterials. 11 types of nanomaterials were tested some of which included 4 or 5 different sizes. In early 2015 the dossiers will be made available to the public. Nevertheless, work continues at OECD to ensure existing test guidelines are adequate to address nanomaterials or, if needed, to develop new or adapted nano-specific test guidelines. This work builds on a publication from 2009, Preliminary Review of OECD Test Guidelines for their Applicability to Manufactured Nanomaterials, which reviewed 115 Test Guidelines and showed that most are suitable but that, in some cases, modifications were needed in order to apply them to nanomaterials. To further identify the specific modifications, a number of workshops were held on: i) Inhalation toxicity (October 2011); ii) Ecotoxicity and environmental fate (January 2013); iii) Physical-chemical properties, held in co-operation with ISO (February–March 2013); iv) Genotoxicity (November 2013); v) Toxicokinetics (February 2014); vi) Physical-Chemical Parameters: Measurements and Methods (June 2014); and vii) Categorisation of nanomaterials (September 2014). As a result of these activities, seven Standard Project Submission Forms (SPSFs) have been endorsed by OECD and Test Guidelines and/or Guidance Documents for their use on nanomaterials are been developed on the following topics: Inhalation; Aquatic (and Sediment) Toxicology Testing of Nanomaterials; Dissolution Rate of Nanomaterials in the Aquatic Environment; Dispersion and Dissolution of Nanomaterials in Aquatic Media – Decision Tree; Assessing the Apparent Accumulation Potential of Nanomaterials; and Dispersibility and Dispersion Behaviour of Nanomaterials in Aquatic Media and Removal from Wastewater. An additional expert meeting was held in October 2014 to further discuss the adaptation of the genotoxicity *in vitro* micronucleus assay (TG 487) for the testing of nanomaterials.

As a separate project, eleven laboratories worldwide have been taking part in *an inter-laboratory study on the Colony Forming Efficiency (CFE) assay*. One positive control (Na<sub>2</sub>CrO<sub>4</sub>) as well as five

different nanomaterials have been tested. The laboratory work on this project has been completed, though some statistical analysis remains to be done. The final report on this project will be made available to WPMN-14 (to be held in February 2015) and considered for declassification.

#### ***Risk Assessment and Regulatory Programmes***

In a parallel way, OECD is looking at risk assessment and existing regulatory programme with the aim to: i) identify regulatory needs for the risk assessment and risk management of manufactured nanomaterials; and ii) develop risk assessment approaches to strengthen and enhance regulatory risk assessment capacity.

Based on the publication of Co-Operation on Risk Assessment: Prioritisation of Important Issues on Risk Assessment of Manufactured Nanomaterials (2013), four projects are currently underway on: i) interspecies Variability Factors in Human Health Risk Assessment; ii) Physical-chemical characteristics in regulatory risk assessments – Dissolution as a function of surface chemistry; iii) Survey on approaches to develop or use nanomaterial equivalence/ grouping/ read-across concepts based on physical-chemical properties for regulatory regimes; and iv) Analysis of Physical-chemical properties for Read-across and Risk Assessment Guidance.

#### ***Exposure Measurement and Exposure Mitigation***

Work on exposure measurement and exposure mitigation continues to be a strong area, in which delegations exchange information on (or develop) guidance for exposure measurement and mitigation. The following areas are currently been completed: i) Exposure assessment: Case studies on nano-silver and nano-gold; ii) assessment of biodurability of nanomaterials and their surface ligands; iii) Harmonised tiered approach to measure and assess the airborne exposure to engineered nano-objects in the workplace; and iv) measurement of manufactured nanomaterials in air.

#### ***Environmentally Sustainable Use of Manufactured Nanomaterials***

In addition, the work on the environmentally sustainable use of manufactured nanomaterials concentrates on the potential of nano-based applications to cope with environmental challenges such as climate change, pollution of water/soil/air and natural resource depletion. It covers the potential negative impacts that new technologies may have on human health and environment. As an outcome of this project, the OECD is finalising a Guidance Manual on Life Cycle Assessment, which places particular attention on multi-walled carbon nanotubes. It is expected that this Guidance Manual will be declassified and published in early 2015. Another project under this area was the publication *Nanotechnology and Tyres: Greening Industry and Transport*. This was a joint project with OECD's Working Party on Nanotechnology (WPN), which is a subsidiary body of the Committee for Science and Technology Policy (CSTP).

#### ***Disposal and Treatment Technologies of Manufactured Nanomaterials***

Finally, OECD has been looking at disposal and treatment technologies of manufactured nanomaterials. A survey was done within the WPMN to identify the state of the art regarding waste and nano. In parallel, the OECD Working Group on Resources Productivity and Waste (WPRPW) produced four documents related to waste containing nanomaterials (WCNMs) on four waste treatment processes of: i) recycling; ii) incineration; iii) wastewater treatment; and iv) landfilling. The purpose of these papers was to identify the current state of knowledge on the fate and impacts of WCNMs in end-of-life treatment processes. The documents are expected to be published by mid-2015.

All the documents developed by OECD are been declassified and made available through the password protected site free of charge. They can all be downloaded in the website:  
<http://www.oecd.org/env/nanosafety>

#### ***Nanotechnology and SAICM's Global Plan of Action***

In accordance with the agreed procedure for the addition of new activities to the Global Plan of Action of the Strategic Approach, 13 activities relating to environmentally sound management of nanotechnologies and manufactured nanomaterials were included in the Global Plan of Action at ICCM3.



Below is a summary of current actions relating to the 13 activities set out in the Global Plan of Action (GPA) relating to environmentally sound management of nanotechnologies and manufactured nanomaterials:

GPA Activity	Outputs
1. Contribute to the development, promotion and adoption of internationally recognized technical guidelines and harmonized standards relating to manufactured nanomaterials.	OECD continues to assess the data generated through the OECD Testing Programme and others international projects in order to identify the testing needs and ensure existing tools are suitable for assessing manufactured nanomaterials. If needed, the OECD will continue to adapt existing test guidelines and/ or guidance documents, or develop new ones (see above).
2. Develop approaches to protect workers, the public and the environment from potential harm related to manufactured nanomaterials.	The International Labour Organization (ILO) has published “Safety and Health in the Use of Chemicals at Work.” It was noted that many national governments have established national task forces to look at potential impacts of nanomaterials, evaluate hazard classification, and risk assessment in order to define management criteria, and to assess regulatory implications
3. Increase the active involvement of the health sector in order to enhance understanding of possible short-term to long-term occupational health impacts of manufactured nanomaterials.	To address occupational risks of nanomaterials, WHO is developing Guidelines on "Protecting Workers from Potential Risks of Manufactured Nanomaterials". These Guidelines aim to facilitate improvements in occupational health and safety of workers potentially exposed to nanomaterials in a broad range of manufacturing and social environments. The guidelines will incorporate elements of risk assessment and risk management and contextual issues. They will support government policy-makers with scientific evidence and recommendations for standards and guidance for safe handling of nanomaterials in the workplace. In addition, the guidelines will serve as a basis for the development of an Implementation Guide containing user-specific guidance and recommendations for target groups, and providing key facts for risk assessment and management. Systematic evidence reviews to provide the basis for the guidelines are underway
4. Increase understanding of the environmental, public and occupational health and safety implications, including risk assessment, of manufactured nanomaterials through coordination, support and/or funding for scientifically sound research.	By systematically reviewing existing risk assessment methodologies, OECD identifies gaps in knowledge and information needed for developing a complete suite of risk assessment tools for manufactured nanomaterials. This fosters research in academic institutions in countries.
5. Enhance information and knowledge sharing on manufactured nanomaterials regarding international, national and regional policy and regulatory initiatives	OECD periodically publishes reviews of on-going regulatory activities in countries.  A series of nanotechnology briefing sessions organized by UNITAR and OECD were held back-to-back with SAICM during its regional workshops for the Africa, Asia-Pacific, Central and Eastern European, and Latin American and Caribbean regions. In addition, UNITAR has developed an e-learning course for all interested stakeholders to further enhance information exchange on on hazards and risks of nanomaterials
6. Highlighting possible synergies with activities undertaken under activity 210 of the Global Plan of Action, explore the development of registers/inventories and/or market assessment activities relating to manufactured nanomaterials.	
7. Promote the availability of information on the presence of manufactured nanomaterials within the product supply and use chain and throughout product life cycles, which could include possible labelling, consistent with relevant international	ISO has developed guidelines for “nano-labelling for well-informed consumer.” The document offers “manufactures a harmonized approach for the voluntary labelling of their nanoproducts and products incorporating nanotechnology.”

obligations, and/or other forms of guidance relating to consumer products containing manufactured nanomaterials.	
8. Review the applicability of the GHS criteria for manufactured nanomaterials as well as how information on safe use should be included in MSDS.	GHS Sub-Committee has agreed to add the item “Review the applicability of GHS to nanomaterials.” An informal correspondence group (ICG) was constituted. The ICG is collecting data from some examples of nanomaterial substances and performing a classification exercise. The ICG agreed also to the fact that the envisaged workstreams and the possible developments of the group for the GHS are long-term processes, and the ICG expressed its wish, to the GHS Sub-Committee, to continue the work on reviewing the applicability of the GHS classification criteria to nanomaterials during the biennium 2015-2016.
9. Promote public awareness-raising activities on manufactured nanomaterials in all regions. 10. Promote the development of country-specific approaches, incorporating life cycle thinking, to nanomaterials in existing national frameworks, policies, regulatory provisions, best practice guidelines and chemical management programmes.	UNITAR continues to raise and promote public awareness-raising activities under phase one and phase two pilot projects. Both Nigeria and Thailand have incorporated an additional chapter on nanosafety issues to their National Profile. Uruguay has done a gap analysis on the state of nano in the country which will assist and strategically places the country in a more advanced position for future national and/or regional activities. Jordan (UNITAR phase 2 pilot project) will produce legislative text on nanosafety issues. In addition, sub-regional workshops will focus on technical trainings for countries already dealing with nanosafety issues.
11. Promote producer responsibility for providing appropriate guidance on safe use of manufactured nanomaterials throughout the supply chain, including the waste stage.	Uruguay, UNITAR phase 1 nanosafety pilot project, produced a report on sustainable management of waste containing nanomaterials.
12. Promote coordinated international, regional and national policy strategies regarding the opportunities and risks of nanotechnology and manufactured nanomaterials.	The Thai Government, under UNITAR phase 1 nanosafety pilot project, has recently approved the National Nanotechnology Policy Framework and a five-year “National Nanosafety and Nanoethics Strategic Plan” to ensure sustainable development of nanotechnology. This plan was jointly developed by key stakeholders and aligned with the current National Chemical Management Plan.
13. Promote public and private sectors partnerships for the environmentally sound management of manufactured nanomaterials to assist countries, in particular developing countries, small island developing States and countries with economies in transition, to build scientific, technical, and legal capacity.	UNITAR is actively involved in engaging Partners under the Nanotechnology Programme. A Partnership with Thailand’s National Nanotechnology Center National Sciences (NANOTEC) supports national pilot projects in Asia-Pacific. Other Partnerships are being actively explored

**Next Steps:**

As activities move beyond awareness raising, both UNITAR and OECD will continue to facilitate information exchange and public dialogue both at the national and regional level in order to enhance stakeholder capacity for the sound management of nanotechnologies and manufactured nanomaterials. Further national pilot projects are planned, pending necessary funding.