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TIMELINE
NANOTECHNOLOGY

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Timeline: Nanotechnology

Policy and Regulation in Canada,
Australia, the European Union, the
United Kingdom, and the United States

Principal Researchers:

Alin Charrière, M.A.

Beth Dunning, M.A.

In collaboration with
Carleton University



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Note from the Series Editor

This timeline outlines important events related to nanotechnology policy and regulation in Canada, Australia, the European Union, the United Kingdom and the United States with an emphasis on developments since 2000. For the purposes of this timeline, Nanotechnology is a term used to describe the manipulation of matter on the molecular scale. For background purposes, the research team has also chosen to include broader developments in science policy as well as significant events outside of the focus regions where deemed appropriate. Please help us keep this timeline accurate and up-to-date by providing comments to issp@uottawa.ca.

Marc Saner
Director, ISSP

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About the Authors

Alin Charrière holds a Master of Arts degree in public administration from Carleton University. He is currently completing admission requirements for graduate studies in economics at the University of Ottawa. His interests include innovation policy, the commercialization of new technologies, and genomics public policy.

Beth Dunning holds a Master of Arts degree in public administration from Carleton University and a Master's degree in Library and Information Studies from McGill University. She is currently working for the HIV/AIDS Research Initiative at the Canadian Institutes of Health Research.

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Timeline: Nanotechnology Policy and Regulation (Canada, Australia, the EU, UK and US)

Event	Who	When	Description
Invention of the field emission microscope	Erwin Wilhelm Müller	1936	The field emission microscope is a type of electron microscope that can achieve magnification up to x1,000,000. It is the first device making it possible to see and analyze the surfaces of materials on a nearly molecular scale, which an important prerequisite towards the manipulation of substances on the nano scale.
Invention of the field ion microscope	Erwin Wilhelm Müller	1951	The field ion microscope is a development of the field emission microscope enabling magnification up to approximately x10,000,000, representing resolution on an atomic scale. By use of this technology, Erwin Müller and his graduate student K. Bahadur are the first in human history to succeed in observing an atom on October 11, 1955.
Coining of the term “molecular engineering”	Arthur von Hippel	1956	Arthur von Hippel of the Massachusetts Institute of Technology (MIT) is credited with coining the term “molecular engineering”. He later authors the important book <i>Molecular Science and Molecular Engineering</i> (1959) where he introduced many important concepts regarding the manipulation of substances at the molecular scale, including the fabrication of nanomolecular devices.
“There’s Plenty of Room at the Bottom”	Richard Feynman	1959	Feynman’s lecture at CalTech is the first to mention of some of the distinguishing concepts in nanotechnology (but predates the use of that term). He described a process by which the ability to manipulate individual atoms and molecules might be developed, using one set of precise tools to build and operate another proportionally smaller set, so on down to the needed scale.
Invention of the atom probe	Erwin W. Müller, John A. Panitz and S. Brooks McLane	1967	This is a further development of the field ion microscopes originally invented by Müller allowing for better analysis of the chemical composition of the substance being magnified.
Term nanotechnology is coined	Professor Norio Taniguchi	1974	Taniguchi coined the term “nano-technology” as “the processing of, separation, consolidation, and deformation of materials by one atom or by one molecule”.
Scanning Tunneling Microscope (STM) invented	Gerd Binnig and Heinrich Rohrer	1981	Binnig and Rohrer of IBM’s Zurich research laboratory invent the STM. An STM is a microscope that uses a tiny stylus to “feel” the surface of objects too small to be viewed by conventional microscopes or even powerful electron microscopes. It is widely used in both industrial and fundamental research to obtain atomic-scale images of metal surfaces. Binnig and Rohrer were awarded the Nobel Prize in physics in 1986 for this invention.

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Event	Who	When	Description
Discovery of buckminsterfullerene – “buckyballs”	Robert Curl, Richard Smalley, and Harold Kroto	1985	Discovery of new forms of the element carbon - called fullerenes - in which the atoms are arranged in closed shells. The number of carbon atoms in the shell can vary, and for this reason numerous new carbon structures have become known. Clusters of 60 carbon atoms, C ₆₀ , were the most abundant. Curl, Smalley and Kroto jointly won the Nobel Prize for Chemistry in 1996.
The Atomic Force Microscope (AFM)	Gerd Binnig, Christoph Gerber, and Calvin Quate (IBM Zurich Research Lab)	1986	Binnig, Gerber and Quate invent the AFM. The AFM is being used to solve processing and materials problems in a wide range of technologies affecting the electronics, telecommunications, biological, chemical, automotive, aerospace, and energy industries. The AFM not only images the surface in atomic resolution but also measures infinitesimal forces at nano-newton scale.
Engineer Eric Drexler publishes book Engines of Creation: The Coming Era of Nanotechnology and co-founded the Foresight Institute	Eric Drexler	1986	In this book, Drexler proposed the idea of a nanoscale assembler that could copy itself, and coined the term “grey goo” to describe what might happen if such a hypothetical self-replicating version of nanotechnology went out of control. Also in 1986, Drexler co-founded the Foresight Institute, a California-based non-profit organization which sought to educate society about both the potential benefits and risks of nanotechnology. The impacts of his early predictions remain in the collective conscious even today. Later, Drexler is the first person in the world to obtain a Ph.D in molecular nanotechnology from MIT in 1991.
Nanoscale materials in personal care products	Ego Pharmaceuticals Pty Ltd. (Australia)	1988	First use of microfine titanium dioxide in a cosmetically acceptable sunscreen.
Key paper Regulating Nanotechnology Development published by David Forrest (MIT)	David Forrest	1989	This paper was originally written for a course on Law, Technology, and Public Policy at the Massachusetts Institute of Technology. In it, Forrest demonstrates an uncanny degree of foresight, especially given that nanotechnology was at a very early stage of development at the time it was written.
Regulatory actions in nanotechnology	Japan, China, US	1990s	Japan, China, and the United States were the first countries to initiate new regulatory regimes that governed nanotechnology R&D. In 1990 Japan announced its formal commitment to funding nanotechnology research and China initiated its ten-year “Climbing Project on Nanometer Science” (1990-1999). The following year, the NSF initiated and funded the first US federal nanotechnology program (on Nanoparticle Synthesis and Processing). These three initiatives were precursors to many new government agencies and regulations in each country regarding the funding, development, and application of nanotechnology.

Event	Who	When	Description
Carbon nanotube discovered	Dr. Sumio Iijima (NEC)	1991	Carbon nanotubes are expected to become a key material in ultrafine devices of the future, because of their unique electrical characteristics, and their extraordinarily fine structure on a nanometer scale. Research is being conducted throughout the world targeting the application of carbon nanotubes as materials for use in transistors and fuel cells, big TV screens, ultra-sensitive sensors...
Nobel Prize for Chemistry	Robert Curl, Harold Kroto, and Richard Smalley	1996	Prize awarded in recognition of 1985 reporting of carbon fullerenes.
Institute of Nanotechnology founded in the UK	Ottilia Saxl	1997	The Institute of Nanotechnology is an important non-governmental organization and think tank on nanotechnology located in the UK.
First safety guidelines released by Foresight Institute	Foresight Institute (US)	1999	The <i>Foresight Guidelines</i> are designed to address the potential positive and negative consequences of nanotechnology in an open and scientifically accurate manner. The objective is to provide a basis for informed policy decisions by citizens and governments, and guidelines for the responsible development of productive nanotechnology. The guidelines originated from a 1999 workshop and have been revised many times since – the current version (6) is dated April 2006.
US National Science and Technology Council Committee on Technology publishes Nanotechnology Research Directions: Vision for Nanotechnology R&D in the Next Decade	US National Science and Technology Council	September 1999	U.S. President Bill Clinton established the National Science and Technology Council (NSTC) by Executive Order on November 23, 1993 as a cabinet-level body to coordinate science, space and technology policies and their related scientific research activities across the U.S. federal government. In this publication, the NSTC provided an inventory of nanotechnology research needs and summarized several recommendations made by consulted experts to improve federal policies in support of nanotechnology research.
Cautionary article on nanotechnology published in <i>Wired</i> magazine by Sun Microsystems co-founder Bill Joy	Bill Joy	April 2000	Sun Microsystems co-founder and prominent American scientist Bill Joy argued that technological advances in the fields of genetic engineering, robotics, and nanotechnology posed significant risks that threatened the very existence of the human species. This is now considered a classic exposition of the ethical dimensions of these new technologies intended for a popular audience.

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Event	Who	When	Description
UK Government Publishes white paper entitled Excellence and opportunity: a science and innovation policy for the 21st century .	UK Government	July 2000	The white paper focuses on the economic potential of new technologies and outlines the UK government's commitment to give "a £250 million boost to research in key new areas that will shape life in the twenty-first century: genomics, e-science and basic technology such as nanotechnology, quantum computing and bioengineering"
President Clinton announces creation of US National Nanotechnology Initiative (NNI)	Bill Clinton	2000	Goals of the NNI are to: (1) maintain a world-class R&D program; (2) facilitate transfer of new technologies into products; (3) develop educational resources, a skilled workforce, and the supporting infrastructure to advance nanotechnology; and, (4) support responsible development of nanotechnology. The 2007 Budget provides over \$1.2B for the multi-agency NNI, bringing the total investment since the NNI was established in 2001 to over \$6.5B.
NanoQuébec is founded	NanoQuébec	2001	NanoQuébec is a not-for-profit organization funded through a combination of federal and provincial government monies, with a mission to strengthen innovation in nanotechnology with the goal of ensuring solid and sustained economic growth for Quebec and Canada.
National Institute of Nanotechnology founded	National Institute of Nanotechnology (Canada)	2002	Announcement of the NINT on the University of Alberta campus as a partnership between the National Research Council, the University and the Governments of Canada and Alberta. NINT is a multi-disciplinary institution involving researchers in physics, chemistry, engineering, biology, informatics, pharmacy and medicine.
Creation of the Canada Nanobusiness Alliance	Canada Nanobusiness Alliance (CNBA)	2002	A trade association involved in establishing a Canadian National Nanotechnology Initiative, and in fostering nanotechnology commercialization in Canada and throughout the world.
Center for Responsible Nanotechnology founded (US)	Center for Responsible Nanotechnology	2002	CRN's mission is to (1) raise awareness of the benefits, the dangers, and the possibilities for responsible use of advanced nanotechnology; (2) expedite a thorough examination of the environmental, humanitarian, economic, military, political, social, medical, and ethical implications of molecular manufacturing; and (3) assist in the creation and implementation of plans for responsible use of this transformative technology. CRN published its first paper in Jan 2003: <i>Safe Utilization of Advanced Nanotechnology</i> (http://www.crnano.org/safe.htm)
US President George W. Bush continues support for development of nanotechnology	George W. Bush	2003	A federal funding increase for nanotechnology is signed into law as the 21st Century Nanotechnology Research and Development Act. US Federal investment in nanotechnology research has increased steadily over the years: the 2009 budget for the US National Nanotechnology Initiative is US \$1.5 billion.

Event	Who	When	Description
UK Advisory Group on Nanotechnology Applications issues report: " New Dimensions for Manufacturing: A UK Strategy for Nanotechnology "	UK Advisory Group on Nanotechnology Application	June 2002	The Advisory Group on Nanotechnology Applications was appointed by the UK Department of Trade and Industry to review the state of nanotechnology applications in UK and to propose actions to accelerate investment in industrial nanotechnologies. The Advisory group examined following promising areas for nanotechnology investment and proposed public sector strategies to encourage investment: <ul style="list-style-type: none"> • electronics and communications; • drug delivery systems; • tissue engineering and medical implants; • nanomaterials at the bio interface; • instrumentation, tooling and metrology; and • sensors and actuators.
Publication of report From Genomes to Atoms: The Big Down	ETC Group	2003	Ottawa-based ETC Group (formerly known as RAFI and famous for coining the term <i>terminator technology</i> in the GMO context) published the report: <i>From Genomes to Atoms: The Big Down</i> . ETC's concerns spanned intellectual property rights, the concentration of corporate control, biological warfare, and the convergence of technology into synthetic biology; the group proposed a moratorium on nanotechnology.
Publication of report Mind the Gap: Science and Ethics in Nanotechnology	Joint Centre for Bioethics (JCB) at the University of Toronto	2003	JCB calls for increased investment in economic, legal and social aspects and regulatory research into nanotechnology. Their paper <i>Mind the Gap: Science and Ethics in Nanotechnology</i> cautioned that there was a risk of derailing the potential benefits of nanotechnology, including for developing countries, if the study of the economic, legal and social aspects of nanotechnology did not catch up to the speed of technology development.
The Better Regulation Task Force releases a report Scientific Research: Innovation with Controls	Better Regulation Task Force (UK)	January 2003	This report recommended that the UK Government should encourage public debate regarding the risks posed by nanotechnologies and should take a lead over any issues of risk management to emerge from nanotechnologies.
International Council on Nanotechnology (ICON) is founded	International Council on Nanotechnology (ICON)	2004	ICON is a partnership between the nanotechnology industry, government, academia and select other organizations. ICON's activities are focused on the promotion of effective nanotechnology stewardship, and include the production and dissemination of information, outreach activities, the strategic identification of knowledge gaps, and research to fill such gaps.

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Event	Who	When	Description
Patent creation class for nanotechnology	US Patent and Trademark Office	2004	US Patent and Trademark Office creates Class 977 for nanotechnology patents.
Publication of Nanoscience and Nanotechnologies: Opportunities and Uncertainties	The Royal Society and The Royal Academy of Engineering (UK)	2004	<p>This report responds to the UK Government's request in June 2003 for an independent study of nanoscience and nanotechnologies. Some recommendations included:</p> <ul style="list-style-type: none"> • The release of manufactured nanoparticles and nanotubes into the environment [should] be avoided as far as possible until more is known about environmental impact • Conduct a series of lifecycle assessments for the applications and product groups arising from existing and expected developments in nanotechnologies • Industry should assess the risk of release of nanoparticles and nanotubes contained in the innovation and design process of products and materials • Ingredients in the form of nanoparticles [should] undergo a full safety assessment by the relevant scientific advisory body before they are permitted for use in products and be assessed as <i>new substances</i> as opposed to different forms of known substances in terms of their risks • Establish an interdisciplinary centre to research the toxicity, epidemiology, persistence and bioaccumulation of manufactured nanoparticles and nanotubes as well as their exposure pathways, and to develop methodologies and instrumentation for monitoring them in the built and natural environment

Event	Who	When	Description
European Commission releases “Toward a European Strategy for Nanotechnology”	European Commission	May 2004	<p>The European Commission adopts the document “Toward a European Strategy for Nanotechnology”. This report proposed strategic directions to encourage the development of nanotechnology while ensuring its proper regulation. Objectives listed in the document included:</p> <ul style="list-style-type: none"> • Increasing and better coordinating R&D in this area • Developing world-class infrastructure for nanotechnology research • Promote the development of skills and business competencies necessary to successfully exploit nanotechnology • Promote an environment conducive to commercialization of nanotechnologies so that research is translated into economic benefits • Integrate societal implications of nanotechnology in the R&D process from an early stage • Generating data required for risk assessment so that potential health, safety, environmental and consumer risks can be assessed, monitored and if necessary addressed. • Engage in international-level activities which can further these objectives.
The US EPA Science Policy Council creates a cross Agency Nanotechnology Workgroup	Environmental Protection Agency (EPA)	December 2004	<p>This group was charged with examining the potential environmental applications and implications of nanotechnology. In February 2007, this group released the US EPA Nanotechnology White Paper, a document which outlines the potential benefits of nanotechnology for the environment, discusses the challenges inherent in the risk assessment of nanomaterials, and makes a number of recommendations with respect to future research needs, pollution prevention and environmental stewardship, collaborations, governance, and training.</p>
“Implications of Nanotechnology for Environmental Health Research”	National Academies (US)	2005	<p>Publication of the proceedings of a Roundtable on Environmental Health Sciences, Research and Medicine. In describing the Canadian perspective, a Health Canada participant states that “a substance-by-substance risk assessment approach may not be effective... Scientists will need to update their risk assessment methodologies to create a multidisciplinary approach including industry; different levels of government; different types of researchers in chemistry, physics, and biology; and research regulatory scientists.”</p>

Event	Who	When	Description
“Canadian Stewardship Practices for Environmental Nanotechnology”	Report by Science-Metrix for Environment Canada	2005	The study examines current research in nanotechnology related to environmental applications, includes a comprehensive review of world strategies and policies to reconcile stewardship issues associated with the development of nanotechnologies, and proposes recommendations to help Environment Canada in targeting environmental applications, maximizing benefits, and minimizing the potentially negative impacts generated by nanotechnology developments.
The PMSEIC releases a report that provides an overview of nanotechnology and its potential benefits, including potential future gains for the Australian economy	Australian Prime Minister’s Science, Engineering and Innovation Council (PMSEIC)	March 2005	In this report, PMSEIC outlined their key findings and recommended that the Australian Government should examine options for implementation of a national strategy regarding nanotechnology that would ensure an appropriate regulatory framework which safeguards the health and safety of Australians
Project on Emerging Technologies is founded	Woodrow Wilson International Center and the Pew Charitable Trusts (US)	April 2005	The Project seeks to ensure that as nanotechnologies advance, risks are minimized, public engagement remains strong, and the potential benefits of these new technologies are realized. Papers/reports are accessible at: http://www.nanotechproject.org/ - among which (for example): <ul style="list-style-type: none"> • Nanotechnology: A Research Strategy for Assessing Risk • An Investigation into how nanotech start-up firms deal with uncertain environmental and health issues related to the production, distribution, and use of their products. These reports are highly relevant to this the Council’s assessment.
ISO Technical Committee TC229 (Nanotechnologies) is established	International Organization for Standardization (ISO)	June 2005	The Committee is chaired by the UK, and Working Groups are established for Terminology and Nomenclature (Canada, Convenor), Measurement and Characterization (Japan, Convenor), and Health, Safety and Environment (United States, Convenor).

Event	Who	When	Description
European Commission adopts an action plan for nanotechnology (“Nanosciences and nanotechnologies: An action plan for Europe 2005-2009”)	European Commission	June 2005	The communication outlines a number of commitments with respect to nanotechnology research and development and establishing an effective dialogue with stakeholders. The Action Plan also underlines a number of commitments with respect to international collaboration on nanosciences and nanotechnologies. In the interests of protecting public health, safety, the environment and consumers, the Action Plan states that risk assessment related to human health, the environment, consumer and workers should be responsibly integrated at all stages of the life cycle of the technology, starting at the point of conception and including R&D, manufacturing, distribution, use and disposal or recycling.
“Opportunities and Risks of Nanotechnologies”	OECD (International Futures Programme) and the Germany-based Allianz Group (insurers)	July 2005	Among the conclusions of the report: <ul style="list-style-type: none"> • With respect to health, environmental and safety risks, almost all concerns that have been raised to date are related to free, rather than fixed manufacture nanoparticles. • A risk assessment for bulk materials is not sufficient to characterize the same material in nanoparticulate form • It is inevitable that in future manufactured nanoparticles will be released gradually and accidentally into the environment • The implications of the special properties of nanoparticles with respect to health and safety have not yet been taken into account by regulators. A review of current legislation and continuous monitoring by the authorities is needed • More funding for independent research on risk issues is necessary
National Nanotechnology Strategy Taskforce (NNST) is established within the Australian Department of Industry, Tourism and Resources	Australian Department of Industry, Tourism and Resources	July 2005	The NNST taskforce delivered their report outlining “Options for a National Nanotechnology Strategy” to the Australian Government in June 2006. Among the recommendations outlined therein were governance options for overseeing the implementation of the strategy and coordination across government departments, establishment of a forum to look at health, safety, and environmental issues, and a recommendation that the Government should undertake an assessment and gaps analysis of current regulatory frameworks.

Event	Who	When	Description
Australian government implements a voluntary reporting scheme for the industrial uses of nanomaterials.	Australian Government Department of Health and Ageing	February 2006	<p>The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) issues a voluntary call for information to industry to provide information on the uses and quantities of nanomaterials being manufactured or imported for industrial purposes, or for use in cosmetics and personal care products.</p> <p>With this call, the Australian Government became the first international government to undertake a voluntary reporting scheme. However, very few companies responded to this call for information. With some additional prodding from the regulatory authority, a total of only about 20 companies eventually responded to this voluntary initiative. Approximately one-third of those surveyed indicated that the nanomaterial(s) were only being used for research purposes.</p>
Creation of a nanotechnology consumer products inventory	Project on Emerging Nanotechnologies	March 2006	The Project on Emerging Nanotechnologies (PEN), based in Washington D.C., launches an inventory of nanotechnology-based consumer products.
<i>Canadian federal government workshop on the health and environmental implications of nanoproducts is held</i>	Interdepartmental Steering Committee for the Health and Environmental Implications of Nanoproducts (Canada)	March 2006	<p>Discussed regulatory science needs for nanotechnology. Recommendations from the workshop included:</p> <ul style="list-style-type: none"> • Formation of federal working group on regulatory science issues; • Enhance partnerships and linkages with stakeholders; • Develop risk management strategies and foresight capacity; • Engage in key international activities, particularly OECD and ISO; and • Develop a communication strategy for government, public & stakeholders
“Nanomaterials in the Workplace: Policy and Planning Workshop on Occupational Safety and Health”	RAND Corporation (US)	April 2006	Report concludes that the U.S. government is providing insufficient funding and other resources to understand and manage risks that nanomaterials pose to the health of workers in the rapidly growing nanotechnology industry.
Report of the OECD Workshop on the Safety of Manufactured Nanomaterials: Building Co-operation, Co-ordination and Communication	OECD	April 2006	The main recommendation of the workshop (held in Dec 2005 in Washington, D.C.) was to establish a Working Group to consider how best to organise future activities to manage and assess nanomaterials for environment, health and safety. It was recommended that the Woodrow Wilson Centre’s database (see above) be eventually taken over by OECD’s Chemicals Programme.

Event	Who	When	Description
National Institute of Nanotechnology	University of Alberta (Canada)	June 2006	Official opening of a new building housing the National Institute of Nanotechnology on the University of Alberta campus.
FoE calls for a moratorium of nanomaterial- containing products	Friends of the Earth (FoE)	June 2006	According to the FoE, over 720 products containing nanomaterials are being released for public consumption without adequate testing. It believes nanoproducts exist in a regulatory vacuum as there are no laws that monitor it.
“The Risk Governance of Nanotechnology: Recommendations for Managing a Global Issue”	International Risk Governance Council (IRGC) (Geneva)	June / July 2006	International forum in Zurich, Switzerland, where IRGC presented its risk governance recommendations to an invited audience of delegates from governments, industry, research and academia, NGOs and international organisations who were given the opportunity to comment on, add to and influence the final recommendations. This followed the IRGC’s white paper on 'Nanotechnology Risk Governance' , which applies the IRGC risk governance framework to nanotechnology, identifies some preliminary risk governance deficits, and proposes overarching recommendations for the management of those deficits.
The FDA (US) establishes the Nanotechnology Task Force	Food and Drug Administration (FDA)	September 2006	The Task Force was charged with outlining regulatory approaches that would allow the continued development of nanotechnology while ensuring that FDA-regulated products containing nanotechnology were both safe and effective. In July 2007, the Task Force released a report which contained a review and analysis of nanotechnology-related science and policy issues falling under the FDA’s jurisdiction. Among the recommendations contained in this report were recommendations to issue guidance to stakeholders, in order to provide greater predictability for industry and to ensure the protection of public health.
“Environmental, Health, and Safety Research Needs for Engineered Nanoscale Materials”	The Nanoscale Science, Engineering, and Technology Subcommittee of the National Science and Technology Council's Committee on Technology (US)	September 2006	The document identifies environmental, health, and safety (EHS) research and information needs related to understanding and management of potential risks of engineered nanoscale materials. The document will be used by Federal agencies participating in the National Nanotechnology Initiative to inform and guide research programs.

Event	Who	When	Description
"Nanotechnology: Assessing the Environmental Risks for Australia"	The Earth Policy Centre (EPC) (Univ of Melbourne)	September 2006	EPC was established in 2005 to put to use research conducted by Australian university students on environmental and sustainability policy issues. The main recommendations of the report are that an immediate moratorium be implemented on the commercial release of nanomaterials; and that a national regulatory authority be established to ensure that the risks of nanomaterials are effectively managed.
The Working Party on Manufactured Nanomaterials (WPMN) is established by the OECD Chemicals Committee	OECD	September 2006	The WPMN coordinates international collaboration relating to the human health and environmental safety aspects of manufactured nanomaterials, in order to assist in the development of safety evaluation protocols for nanomaterials.
Assembly bill 289 authorizes the collection of information on production of nanosubstances	California	September 2006	This bill passed by the California state legislature authorizes the California Environmental Protection Agency and other state agencies to request and collect information from chemical manufacturers and importers on environmental and health impacts of nanomaterials and testing techniques employed.
IEC establishes the Technical Committee 113 (Nanotechnology – Standardization for Electrical and Electronic Products)	International Electrotechnical Commission (IEC)	October 2006	The committee is composed of 15 participating members and 11 observer members. The purpose is to develop standards for electrical and electronic products and systems with nanotechnological aspects. Also created are Joint Working Groups to facilitate coordination between IEC 113 and ISO Technical Committee 229 (Nanotechnologies).
EU-funded Nanologue project aims to establish a common understanding concerning ethical, legal, social aspects of nanotechnology and to facilitate a Europe-wide dialogue among science, business and civil society.	European Union	November 2006	Based on extensive research and stakeholder consultations, the 21-month collaborative project (now complete) developed several products to enhance the dialogue about ELSI aspects of nanotechnology applications, including the pamphlet, released in November 2006, entitled "The Future of Nanotechnology: We Need to Talk".

Event	Who	When	Description
Commission de l'éthique de la science et de la technologie in Québec issues a position statement " Ethics and Nanotechnology: A Basis for Action "	Commission de l'éthique de la science et de la technologie (Québec)	November 2006	This position statement contains a comprehensive analysis of laws and regulations currently in place, both in Canada and in Quebec, to manage the potential risks of nanomaterials throughout the product life cycle. With respect to the regulation of nanotechnology, the Commission finally recommended that the Quebec Government, guided by the principle of precaution and from the perspective of sustainable development, be concerned with all phases of the life cycle of a product derived from nanotechnology or containing nanometric components, and that in this respect it should integrate the concept of life cycle into all policies where such an approach is appropriate, in order to avoid any damaging impact of technological innovation on health and the environment.
Regulatory approach for nanomaterials under the Canadian Environmental Protection Act	Environment Canada and Health Canada	December 2006	Proposed regulatory regime for nanomaterials, targeting mainly industrial substances, is being considered by the New Substances Program of Environment Canada and Health Canada in two phases: Phase 1 (fall 2006 – fall 2008): Inform industry that "new" nanomaterials are subject to notification under the New Substances Notification Regulations and develop a voluntary program to obtain data from industry to build a knowledge base for nanomaterials. Phase 2 (fall 2008 – fall 2010): Resolution of standard nomenclature and terminology by ISO TC229 and establishment of specific data requirements for nanomaterials under the current notification regulations.
An independent regulatory gaps analysis for nanotechnology is completed by Cardiff University, " An Overview of the Framework of Current Regulation affecting the Development and Marketing of Nanomaterials "	Cardiff University	December 2006	This comprehensive report took the approach of mapping current and future foreseeable applications of nanomaterials against existing UK regulatory frameworks that might govern the lifecycle of nanomaterials. In this report, the authors noted two main regulatory issues: regulatory gaps arising in situations where thresholds have previously been established to govern whether or not materials or products fall within the scope of the regulation, and what to do when a nanomaterial represents a variation of a bulk substance that is already well regulated and understood (e.g. nanosilver versus silver).

Event	Who	When	Description
The Berkeley Municipal Code is amended to introduce new measures regarding manufactured nanomaterial health and safety	The City of Berkeley (US)	December 2006	These amendments require facilities that manufacture or use nanomaterials to disclose in writing which nanomaterials are being used as well as the current toxicology of the materials reported (to the extent known) and to further describe how the facility will safely handle, monitor, contain, dispose, track inventory, prevent releases and mitigate such materials. Berkeley is currently the only municipal government in the United States to regulate nanotechnology.
Start of the European Union's Seventh Framework Programme for Research and Technological Development	European Union	2007	The seventh framework program commits 3.4 million Euro towards initiatives that promote European competitiveness and support a transition to a knowledge-based economy through nanotechnology and nanosciences. This funding is distributed through the program's "cooperation" initiative.
UNESCO published the book " Nanotechnologies, Ethics and Politics "	UNESCO	2007	This UNESCO publication presents various expert assessments of health and environmental issues related to the use of nanomaterials. It considers topics such as: how best to control and regulate nanoscale materials, concerns around military and biomedical applications of nanotechnology, opportunities for international cooperation, and the application of nanotechnology to the needs of developing countries.
Canada releases its comprehensive Science & Technology (S&T) Strategy " Mobilizing Science & Technology to Canada's Advantage "	Government of Canada	2007	With respect to nanotechnology, the S&T Strategy notes that the challenges and opportunities of nanotechnology are yet to be fully realized. The Strategy calls for support of nanotechnology by strong science and effective regulation to protect human health and the environment while supporting Canadian competitiveness.
The Working Party on Nanotechnology (WPN) is established by OECD's Committee for Science and Technology Policy	OECD	2007	The objective of the WPN is to advise on emerging policy issues related to science, technology, and innovation, and to promote international co-operation to facilitate research, development, and the responsible development and use of nanotechnology.

Event	Who	When	Description
ICTA releases “Declaration Principles for the Oversight of Nanotechnologies and Nanomaterials”	International Center for Technology Assessment (ICTA)	2007	The Declaration Principles for the Oversight of Nanotechnologies and Nanomaterials was signed by a broad coalition of civil society, public interest, environmental and labour organizations and was endorsed by nearly 70 groups spread over six continents.
The final report of the NEG, entitled “Democratic Technologies?” is published	Nanotechnology Engagement Group, UK (NEG)	2007	This report looks at six projects in the UK that sought to engage the general public in a dialogue on nanotechnology. Based on their analysis of these projects, the NEG concluded that upstream public engagement on issues of science and technology was beneficial because it: informed and aligned science policy and research with public needs and aspirations; made science governance more transparent; put science into context by encouraging reflection by scientists on the broader implications of their work; created more active and scientifically aware citizens; and helped to overcome negative preconceptions and to break down cultural barriers between scientists, the general public, and decision makers.
“Nanotechnology White Paper”	U.S. Environmental Protection Agency	February 2007	The paper assesses the environmental applications and implications of nanotechnologies with a view to guiding the EPA’s regulatory and surveillance activities.
OECD/Academies Workshop on environmental, health and safety impacts of manufactured nanoparticles	Various Academies and OECD Working Party on Manufactured Nanomaterials; Dortmund, Germany	March 2007	Principal conclusions were: (1) Exploratory research into the fundamental mechanisms of interacts between nanomaterials and biological material will help to verify test protocols and develop new methods in predictive toxicology. Targeted research is needed to ensure adequate understanding of nanomaterials that are close to market; (2) A panel of reference nanomaterials needs to be selected and made available to researchers for the development and validation of toxicity tests and characterisation methods; (3) There is an immediate need for validated methods for characterising nanomaterials that have been tested by several research groups before being adopted; (4) Further development, standardisation and validation of <i>in vitro</i> testing is likely to be required before these can be used as toxicity screens for inhaled fine and nanosized particles; (5) The OECD could develop standards of practice for environmental and health research on nanoparticles, enabling laboratories to produce comparable results. (Ref: The Royal Society (UK) Policy Document 13/07)

Event	Who	When	Description
Council for Science and Technology publishes its independent review “Nanosciences and Nanotechnologies: A Review of Government’s Progress on its Policy Commitments”	Council for Science and Technology (UK)	March 2007	In this report, the Council for Science and Technology concluded that progress on many commitments had been good, but criticized progress on governmental research commitments, particularly with regards to toxicology and the health and environmental impacts of nanomaterials.
ISO publishes a special issue of ISO Focus on Nanotechnologies	International Organization for Standardization (ISO)	April 2007	The special issue includes articles by Canadians: Dr. Clive Willis (Convenor, ISO/TC 229, Nanotechnologies/WG 1, Terminology and Nomenclature) “Nanotechnology the Terminology Challenge” and Dr. George Wolbring (University of Calgary, member Canadian Advisory Committee for ISO/TC 229, Nanotechnologies), “Social and ethical issues of nanotechnologies”.
International Union of Food, Farm and Hotel Workers (IUF) calls for a moratorium on the use of nanotechnology in food and agriculture	International Union of Food, Farm and Hotel Workers	March 2007	The resolution was passed during their March 2007 meetings in Geneva. The IUF represents workers in more than 300 unions in 120 countries.
The New Substances Division at Environment Canada issued an advisory note clarifying the requirements for nanomaterials under the New Substances Notification Regulations (NSNR)	Environment Canada	June 2007	According to this advisory note, a nanoscale form of a substance already listed on the Domestic Substances List (DSL) would be classified as a new substance under the NSNR if it possesses unique structures or molecular arrangements (such as carbon nanotubes), as would nanosubstances not already listed on the DSL. Nanoscale forms of substances already on the DSL without unique structures or molecular arrangements, however, are considered existing and are therefore not subject to the Regulations.
Environmental Defense – DuPont Nano Partnership releases NANO Risk Framework	Environmental Defense – DuPont Nano Partnership	June 2007	The intent of the framework is to define a systematic and disciplined process that can be used to identify, manage and reduce potential environmental, health and safety risks of nano-scale materials across all lifecycle stages to help ensure that nanotechnology’s benefits are maximized while the potential risks are effectively assessed and managed.

Event	Who	When	Description
“Nanotechnology: A Report of the U.S. Food and Drug Administration Nanotechnology Task Force”	U.S. FDA	July 2007	<p>“A general finding of the report is that nanoscale materials present regulatory challenges similar to those posed by products using other emerging technologies. However, these challenges may be magnified both because nanotechnology can be used in, or to make, any FDA-regulated product, and because, at this scale, properties of a material relevant to the safety and (as applicable) effectiveness of FDA-regulated products might change repeatedly as size enters into or varies within the nanoscale range. In addition, the emerging and uncertain nature of the science and potential for rapid development of applications for FDA-regulated products highlights the need for timely development of a transparent, consistent, and predictable regulatory pathway” (FDA 2007: ii).</p>
First meeting of the International Cooperation on Cosmetic Regulation initiative (referred to as ICCR-1)	United States, Japan, the European Union and Canada	September 2007	<p>The International Cooperation on Cosmetic Regulation (ICCR) initiative includes cosmetic regulatory authorities from the United States, Japan, the European Union and Canada. This group meets on an annual basis to discuss common issues relating to safety and regulation and to engage cosmetics industry groups in dialogue.</p> <p>During its first meeting, ICCR called on the cosmetics industry to develop a common definition of nanotechnology and to set up an inventory of its current applications in cosmetic products in order to help regulators assess potential risks and safety issues.</p>
Environment Canada and Health Canada jointly issue a “Proposed Regulatory Framework for Nanomaterials under the Canadian Environmental Protection Act, 1999”	Environment Canada and Health Canada	September 2007	<p>This proposed framework seeks to address nanomaterials in a manner which ensures the responsible introduction of nanomaterials to the Canadian market through a program which scientifically assesses and appropriately manages any potential risks. The document proposes a two phased approach to the development of a regulatory framework for nanomaterials.</p>
The European Commission issues the first implementation report on its action plan on nanosciences and nanotechnology	European Commission	September 2007	<p>This document provides an initial report on progress achieved since the launch of the European Union’s Action Plan on Nanosciences and Nanotechnology for 2005-2009.</p>

Event	Who	When	Description
European Commission establishes advisory group on the regulation of nanomaterials	European Commission	March 2008	This group, called the Competent Authorities for REACH and CLP Subgroup on the regulation of Nanomaterials (CASG nano), is an advisory body that assists the European Commission in the implementation of European Union REACH and CLP guidelines that govern environmental health and safety aspects and product labeling with respect to nanomaterials.
Nanoscale Materials Stewardship Program (NMSP)	FDA	January 2008	The U.S. EPA launched a program that asks industries to submit available information about the nanomaterials that they manufacture or use. The voluntary program, called the Nanoscale Materials Stewardship Program (NMSP), was intended to provide basic information to help guide regulatory decisions. In the 7 months since its launch, 22 companies have reported to EPA, but critics say that the program is creeping along and that the human-health and environmental risks of this rapidly growing technology remain uncertain.
Consumers Council of Canada releases the report " Nanotechnology and Its Impact on Consumers "	Consumers Council of Canada	February 2008	With support from Industry Canada Office of Consumer Affairs, the report was prepared with the intention of providing consumers in Canada with objective information on nanotechnology. A key aspect of this study was a survey of the Canadian public and consumer representatives. This survey found that 70% of those surveyed lacked awareness of nanotechnology, although a majority of Canadians (despite their lack of awareness) were generally optimistic regarding the technology and had few concerns about risks.
EC produces a " Recommendation on a Code of Conduct for Responsible Nanoscience and Nanotechnologies Research " circulated to all Member States	European Commission	February 2008	Consistent with the EU approach, this Recommendation was developed in consultation with the public. The stated aim of this Code of Conduct is to promote integrated, safe and responsible nanosciences and nanotechnologies research in Europe for the benefit of society as a whole. The Code is underpinned by the principles of: meaning, sustainability, precaution, inclusiveness, excellence, innovation, and accountability. The intention of this document is to guide the actions of Member States in the formulation and implementation of both innovation and regulatory research strategies in individual jurisdictions.

Event	Who	When	Description
Ministerial Group on Nanotechnologies issues a Statement by the UK Government about Nanotechnologies	Ministerial Group on Nanotechnologies (UK)	February 2008	This document outlined a vision for nanotechnologies, as follows: “The vision of the UK Government for nanotechnologies is for the UK to derive maximum economic, environmental and societal benefit from the development and commercialization of nanotechnologies, and to be in the forefront of international activity to ensure there is appropriate control of potential risks to health, safety and the environment. Furthermore, the Government committed to openness regarding its activities and transparency regarding any uncertainties in the science. With respect to the regulation of nanotechnology, the Government noted the need to manage the potential risks associated with nanotechnology within the context of a proportionate regulatory framework”.
US National Institute of Occupational Health and Safety creates a field research team to assess emerging occupational hazards related to nanotechnology	US National Institute of Occupational Health and Safety	February 2008	The goals of this field research team are to identify sources of exposure to nanomaterials in the workplace that could have negative consequences for human health, recommend safe work practices, and assess exposure control methods.
London School of Economics launches a research program on Nanotechnology Policy and Regulation	London School of Economics	February 2008	LSE launches an interdisciplinary research program on nanotechnology policy and regulation. This program is housed in the School’s Department of International Relations.
Australia formally establishes a National Nanotechnology Strategy		February 2008	The purpose of the strategy is to create an environment that allows Australia to benefit from nanotechnologies while properly identifying, assessing and regulating its risks. Key initiatives included: 1) the creation of the Australian Office of Nanotechnology, which was charged with the implementation of the strategy; 2) a review of regulatory frameworks governing environmental release of nanomaterials; 3) public engagement and awareness initiatives; 4) measurement and tracking of nanomaterials; 5) international activities; and 6) industry engagement activities.

Event	Who	When	Description
ICTA led a coalition of consumer, health and environmental groups in filing a legal petition with the US Environmental Protection Agency	International Center for Technology Assessment (ICTA)	May 2008	The petition demanded that the Environmental Protection Agency exercise its authority pertaining to the regulation of pesticides to prevent the sale of consumer products containing nanoparticles of silver for antimicrobial purposes.
SCCP releases a document entitled " Opinion on Safety of Nanomaterials in Cosmetic Products "	Scientific Committee on Consumer Products (EU)	March 2008	This Opinion outlined a number of areas where, at the time, there remained inadequate information on the risks associated with nanoparticle use in cosmetic applications. In addition, SCCP recommended that the safety of insoluble nanomaterials in sunscreens should be evaluated.
" Nanotechnology and Its Impacts on consumers "	Consumer Council of Canada	March 2008	The report contains information on what products contain nanotechnology, why they are different, benefits and risks associated with technology. This represents consumer response to the growing prevalence of nanotechnology.
After almost a year of study and comment, the Working Group of the European Responsible Nano Code released its <i>Seven Principles of the Code</i> and an accompanying series of <i>Examples of Good Practice</i>	Royal Society, the Nanotechnology Knowledge Transfer Network, Insight Investment, and the Nanotechnology Industries Association	June 2008	The Responsible Nano Code is a partnership among the Royal Society, the Nanotechnology Knowledge Transfer Network, Insight Investment, and the Nanotechnology Industries Association whose goal is to "explore the societal and economic impact of the technical, social and commercial uncertainties related to nanotechnologies."

Event	Who	When	Description
As part of its first regulatory review on nanotechnology, the European Commission issues a “Communication on Regulatory Aspects of Nanomaterials”	European Commission	June 2008	This Communication was prepared in response to a commitment by the EC to conduct a regulatory review of EU legislation in relevant sectors of relevance to nanotechnology. As outlined in this document, the regulatory challenge is therefore to ensure that society can benefit from novel applications of nanotechnology, whilst a high level of protection of health, safety and the environment is maintained. The Commission concludes that, overall, risks related to nanotechnology can be dealt with under the current legislative framework, but that certain modifications may be required in light of new information becoming available, for example with regards to the threshold volumes applicable in certain legislative documents. Also accompanying the document was a staff working paper .
The report “Review of Possible Impacts of Nanotechnology on Australia’s Regulatory Frameworks” (Monash University) released to the public	Monash University	July 2008	As part of the public announcement, the Australian Government also released a position statement on nanotechnology. Entitled “Australian Government Approach to the Responsible Management of Nanotechnology”, this statement provides an overview of Government policy regarding nanotechnology development and regulation. The Government concludes that there has so far been no demonstrated need for a specific regulatory system for engineered nanomaterials.
CCA releases a report entitled “Small is Different: A Science Perspective on the Regulatory Challenges of the Nanoscale”	Council of Canadian Academies (CCA)	July 2008	This report from the CCA Expert Panel on Nanotechnology was prepared for the Government of Canada in response to a request originating from the Minister of Health. This report concludes that existing Canadian regulatory approaches and risk management strategies are sufficient to deal with the assessment of nanomaterials, with a few caveats. For example, the expert panel noted the need for greater investment in regulatory-relevant research, particularly research associated with the risk assessment of nanomaterials. In addition, the panel stated that attention should be paid to addressing outstanding regulatory issues such as: regulatory triggers, regulatory capacity, and governance models for the coordination of nanotechnology-related activities among federal regulatory agencies, between the federal and provincial levels of government, and among international regulatory agencies.

Event	Who	When	Description
WPMN produces " List of Manufactured Nanomaterials and List of Endpoints for Phase One of the OECD Testing Programme " related to safety testing of nanomaterials	OECD Working Party on Manufactured Nanomaterials (WPMN)	July 2008	The WPMN has developed and agreed upon a priority list of fourteen representative manufactured nanomaterials that will be the focus of further investigation. The document also contains a list of approximately 60 endpoints dealing with the identification of nanomaterials, their physico-chemical properties and characterization, environmental fate and toxicology, mammalian toxicity, and material safety.
PEN releases report " Nanotechnology Oversight "	Project on Emerging Nanotechnologies (PEN)	July 2008	The report outlines a proposed regulatory agenda relating to nanotechnology for incoming US President Barack Obama.
Nanotechnology Recent Developments, Risks, and Opportunities	Lloyds Group of London	August 2008	This report provides an overview of issues related to nanotechnology and nanomaterials and the associated risks from the point of view of the liability insurance industry.
Consumer Product Safety Commission	Project on Emerging Nanotechnology	August 2008	The inability of the Consumer Product Safety Commission to carry out its mandate with respect to simple, low-tech products such as children's jewelry and toy trains bodes poorly for its ability to oversee the safety of complex, high-tech products made using nanotechnology, according to a report written by consumer product expert and Harvard lecturer E. Marla Felcher .
Creation of the Center for the Environmental Implications of NanoTechnology	Duke University / National Science Foundation / US EPA	September 2008	Funding from the National Science Foundation and the US Environmental Protection Agency allows Duke University to establish a research centre on the environmental impacts of nanotechnology. The center's mandate covers the impact of nanomaterials on the environment as well as plant and animal life. One of its major aims is to "develop risk assessment tools to provide guidance in assessing existing and future concerns surrounding the environmental implications of nanomaterials."

Event	Who	When	Description
EPA issues a Notice in the Federal Register that they consider carbon nanotubes to be a chemical substance distinct from graphite and other allotropes of carbon already in the TSCA Inventory	Environmental Protection Agency (EPA)	October 2008	As a result of this notice, carbon nanotubes are considered new substances under TSCA, and become subject to the Premanufacture Notices reporting requirements (see entry below: “EPA begins to promulgate Significant New Use Rules (SNURs) under TSCA for certain nanoforms”).
RCEP published a report entitled “ Novel materials in the environment: The case of nanotechnology ”	UK Royal Commission on Environmental Pollution (RCEP)	November 2008	This report contains a number of observations regarding the toxicology and fate of nanomaterials, functionality, and adaptive governance. Overall, the Commission recommended that governance approaches to the regulation of nanotechnology should be based on the functionality of materials, rather than particle size or mode of production, as this is the key consideration when evaluating potential environmental and health impacts.
EPA begins to promulgate Significant New Use Rules (SNURs) under TSCA for certain nanoforms	Environmental Protection Agency (EPA)	November 2008	Under the significant new use provisions of the <i>Toxic Substances Control Act</i> (TSCA), such regulatory action by the EPA requires persons intending to manufacture, import, or process chemical substances for an activity that is designated as a significant new use under the statute to notify EPA of their intent at least 90 days prior to commencing that activity.
US National Research Council releases report “ Review of the Federal Strategy for Nanotechnology-Related Environmental, Health and Safety Research ”	US National Research Council	December 2008	The report outlines several weaknesses of the US National Nanotechnology Initiative’s research plan on the environmental health and safety of nanomaterials used in industry and consumer products. The report draws attention to the need to produce research that serves a broader range of stakeholders.
European Commission launches a comprehensive REACH Implementation Project on Nanomaterials (RIPoN)	European Commission	2009	This project examines the implementation of the REACH framework governing the environmental health and safety aspects of nanomaterials. A summary of results and final reports are available here .

Event	Who	When	Description
A study funded by the Quebec-based IRSST is released concerning worker safety entitled " Best Practices Guide to Synthetic Nanoparticle Risk Management "	Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST)	January 2009	The study report aims to provide information and best practices relating to the management of potential risks associated with nanotechnology in the workplace. The authors of the report recommend taking a preventative approach, even a precautionary approach, to the avoidance of nanoparticle exposure.
Member of the European Parliament (MEP) Carl Schlyter brings forward a Draft Report on regulatory aspects of nanomaterials to the Committee on the Environment, Public Health and Safety of the European Parliament	Committee on the Environment, Public Health and Safety of the European Parliament	January 2009	This draft Report contains the text of a Motion for a European Parliament Resolution on regulatory aspects of nanomaterials. The Motion contained within this draft Report calls for labeling of consumer products containing nanomaterials, the urgent development of adequate testing protocols to assess the hazards of and exposure to nanomaterials over their entire lifecycle, the development of ethical guidelines, a potential limitation of patent rights in order to avoid stifling innovation, among other aspects.
The DTSC (California) issues formal information request letters	California Department of Toxic Substances Control (DTSC)	January 2009	The letter were sent to a number of manufacturers, requiring information on firms' activities relating to producing or importing carbon nanotubes in California, and on who may import them into the State. This followed DTCS's announcement of its intention to exercise the regulatory authority granted to them through new sections of the Health and Safety Code adopted in 2006.
SCENIHR releases an Opinion on the Risk Assessment of Products of Nanotechnologies	Scientific Committee on Emerging and Newly Identified Health Risks (EU)	January 2009	In this document, they recommend adopting a case-by-case approach to the risk assessment of nanomaterials until such a time as a general approach to the identification of hazards associated with nanomaterials is within reach.
French government tables first mandatory information gathering scheme that extends to all nanomaterials	French government	January 2009	Article 73 of the proposed legislation includes the requirement that any person manufacturing, importing, or selling nanoparticles must make regular declarations to regulators about the identity, quantities and uses of these substances.

Event	Who	When	Description
British House of Lords Select Committee on Science and Technology launches an inquiry on the use of nanotechnologies and nanomaterials in the food sector	British House of Lords	February 2009	The Committee focused on the following areas: food products, additives and supplements; food contact packaging; food manufacturing processes; animal feed; pesticides and fertilizers; and products that may come into contact with food, such as food containers and cooking utensils.
The US <i>Toxic Substances Control Act</i> (TSCA) is revisited in a series of hearings by the Subcommittee on Committee, Trade, and Consumer Protection of the US House of Representatives Committee on Energy & Commerce	Subcommittee on Committee, Trade, and Consumer Protection of the US House of Representatives Committee on Energy & Commerce	February 2009	Among the first witnesses to appear before the Subcommittee was J. Clarence (Terry) Davies , a Senior Advisor to the Project on Emerging Nanotechnologies at the Woodrow Wilson International Center for Scholars. According to his testimony, TSCA has both strengths and weaknesses as it pertains to the regulation of nanotechnology. Among the strengths of TSCA, Davies noted, are its broadness and potential flexibility; its reporting mechanisms, which allow the EPA to require manufacturers to immediately notify them of new information pertaining to substantial risks associated with a particular chemical; and the general cost-benefit framework of TSCA. However, Davies also noted that TSCA additionally contains a number of very difficult, perhaps impossible, requirements that must be met before a chemical can be regulated.
US National Institute for Occupational Safety and Health (NIOSH) publishes interim safety guidelines for working with nanomaterials in the workplace	US National Institute of Occupational Health and Safety	March 2009	This report entitled " Approaches to Safe Nanotechnology: Managing the Health and Safety Concerns Associated with Engineered Nanomaterials " summarizes work conducted by NIOSH up to the publication date to assess potential hazards for human health resulting from exposure to nanomaterials in the workplace. The report identified dangers related to airborne nanoparticles entering the respiratory system and identifies several mechanisms that could lead to this type of exposure. The report also highlights the limited state of knowledge with respect to the dangers of nanomaterials and states that more work is needed to assess the toxicity and other potential harmful effects of specific materials. It recommends caution until potential hazards are better understood.

Event	Who	When	Description
European Food Safety Authority releases the Scientific Opinion on the <i>Potential Risks Arising from Nanoscience and Nanotechnologies on Food and Feed Safety</i>	European Food Safety Authority	March 2009	In this report, the EFSA Scientific Committee concludes that while it is currently possible to apply internationally accepted risk management approaches to the case of engineered nanomaterials, in the short term future it will be necessary to assess each nanomaterial on a case-by-case basis. The basis for this opinion was that current data gaps and a lack of validated assessment methodologies are such that the risk assessment of specific nano products is subject to a high degree of uncertainty.
The European Parliament calls for labeling of food products containing nanomaterials (Novel Food Regulation)	European Parliament	March 2009	The European Parliament calls for safety assessments and labeling of food products that contain or are produced through nanotechnology. Due to the lack of validated methods for assessing the safety of such foods at the time of this proposal, this would have amounted to a de-facto moratorium of nanotechnology in food. This change to European Novel Food regulations was never adopted.
Australian government releases Powering Ideas: An Innovation Agenda for the 21st Century as part of its 2009-10 budget, and announces the creation of a National Enabling Technologies Strategy and a Super Science Initiative	Government of Australia	May 2009	Australia launches a suite of programs in support of science and innovation in its 2009-10 Commonwealth budget. These include: 1) a National Enabling Technology Strategy replacing a suite of existing programming, including programs in support of biotechnology and Australia's National Nanotechnology Strategy; and 2) a "Super Science Initiative" investing in scientific infrastructure. Both initiatives aim to improve management and regulation of new technologies and invest in infrastructure to benefit industry and government regulatory science.
A PEN poll shows 9 out of 10 Americans want to know more about the development of new technologies, including nanotechnology	Project on Emerging Nanotechnologies (PEN)	September 2009	A survey of 1,001 US adults reveals that awareness of nanotechnology remains relatively unchanged since 2006, with around 30% of respondents saying they had heard "some" or "a lot" about these technologies.

Event	Who	When	Description
Final report of US/EU research collaboration is published: Securing the Promise of Nanotechnologies Towards Transatlantic Regulatory Cooperation	Chatham House, the London School of Economics, the Environmental Law Institute, the Project on Emerging Nanotechnologies	September 2009	The report addresses the question: What should the EU and US do to promote more effective and convergent regulation of nanomaterials? The report concludes that there is a need to establish a scientific basis for risk assessment of nanomaterials, that governments on both sides of the Atlantic need to increase funding into the risks of nanomaterials, but that there is no overwhelming case for international safety and labelling requirements. The OECD is identified as an important forum for regulatory coordination, but there is a need for more transparency in governance and the inclusion of developing countries.
The EC announces it will review all legislation and regulations relating to nanomaterials by April 2011	European Commission	October 2009	The European Commission undertook this work in response to a motion of the European Parliament calling for a review of all legislation and regulation in respect to health and environmental safety issues related to nanomaterials over their life cycle.
European conference <i>Nanomaterials on the Market: What Regulators Need to Know</i> held in Brussels	European Commission	October 2009	The conference brought together a diverse group of stakeholders to discuss information requirements for nanotechnology under REACH, their adequacy and how information could best be gathered from industry.
European Commission issues second implementation report on its action plan on nanosciences and nanotechnology	European Commission	October 2009	The European Commission issues its second implementation report on the Action Plan on Nanosciences and Nanotechnology for 2005-2009.
Centre for Nano Safety is launched	Edinburgh Napier University (UK)	November 2009	The Centre is part of Edinburgh Napier's School of Life Sciences and is one of the first in the UK that brings together nano-science safety research across human, environment, reproductive health and microbiology.
The Australian National Industrial Chemicals Notification Scheme (NICNAS) launches a public consultation on a on nanomaterials regulation strategy	Australian National Industrial Chemicals Notification Scheme (NICNAS)	November 2009	The Australian government's "Proposal for Regulatory Reform of Industrial Nanomaterials" addresses the regulation of nanoforms, existing and new chemicals, and proposes an integrated approach for industrial nanomaterials within the NICNAS framework as Australia's long term strategy.

Event	Who	When	Description
The European Union Council approves an updated European Cosmetics Regulation	European Union Council (EC)	November 2009	The approved regulation requires manufacturers of new cosmetic products that contain nanomaterials to notify the EC and provide information six months before the product is released on the European market. The text was originally adopted by the European Parliament in March 2009.
Australian Academy of Sciences publishes report: Nanotechnology in Australia Trends, applications and collaborative opportunities	Australian Academy of Sciences	December 2009	The report notes that Australia's international ranking in nanotechnology is increasing but still lags behind world leaders in the field according to a bibliometric analysis. The report makes several recommendations for improving Australia's international standing in this field.
EU Directorate General of Environment initiates a scientific review of nanomaterials registration	EU Directorate General of Environment	2010	This project, officially titled " Scientific technical support on assessment of nanomaterials in REACH registration dossiers and adequacy of available information ", was intended to identify REACH registration dossiers covering nanomaterials, review scientific information in these dossiers, and identify cross-cutting problems with respect to nanotechnology. This task was completed in March 2012. The final report can be found here .
British House of Lords Science and Technology Committee releases report Nanotechnologies and Food	British House of Lords	January 2010	The report criticizes the food industry for failing to be transparent about its research into the uses of nanotechnologies and nanomaterials, urges the Government to fund research into potential health and safety risks arising from the use of nanomaterials in the food sector. They recommend that the Food Standards Agency maintain a publicly available register of food and food packaging containing nanomaterials, and calls for nanomaterials to be defined clearly in food legislation to ensure that all uses of nanomaterials in food are subject to appropriate risk assessment procedures.
Nanotechnology Safety Act of 2010 is introduced in US Congress	US Senate	January 2010	US Senators Mark Pryor (D-AR) and Benjamin L. Cardin (D-MD) introduce the <i>Nanotechnology Safety Act of 2010</i> . The act proposes a program managed by the Food and Drug Administration (FDA) that would assess the safety of nanotechnology in consumer products and set forth best practices for companies who are using nanotechnology. This bill is never passed into law.

Event	Who	When	Description
The US 2011 federal budget request for nanotechnology safety research comes to \$116.9 million – three times more than was invested in 2006	US Federal Government	February 2010	The Food and Drug Administration (FDA) and the Consumer Products Safety Commission (CPSC) request nanotechnology specific funding for the first time as part of the National Nanotechnology Initiative (NNI) budget request.
Australian government officially launches National Enabling Technologies Strategy	Australian Government	February 2010	The National Enabling Technologies Strategy announced in Australia's 2009-10 Commonwealth Budget is officially launched.
The EC consultations on a new Action Plan for Nanotechnology close	European Commission (EC)	February 2010	The EC's Directorate General for Research held a public consultation about a new action plan for nanotechnology in the EU, focusing on the 2010-2015 time frame. The summary report from this consultation is available here .
Last debate takes place as part of French public consultations on nanotechnology	Commission particulière du débat publique Nanotechnologies (CNDP)	February 2010	The CNDP organized a four-month discussion series in various cities where the public could debate with experts advances and dilemmas in nanotechnology. The final summary is available here (in French only). Many of the public debates were disrupted by environmental groups who believe the events were a "greenwash" and one-sided.
Health Canada launches a public consultation on its Interim Policy Statement on Health Canada's Working Definition for Nanomaterials	Health Canada	March 2010	The policy statement aims to establish a transparent working means of identifying nanomaterials and to provide Health Canada with a consistent set of approaches across the department. The proposed working definition is intentionally broad and is intended to be applied more specifically in each regulatory program area. A summary of feedback received can be found here .
Peter Julian, NDP MP, tables Bill C-494 in the Canadian House of Commons	Peter Julian, New Democratic Party (NDP) Member of Parliament (MP), Canadian House of Commons	March 2010	The private Members' bill proposes that nanotechnology be included in the <i>Canadian Environmental Protection Act</i> , and would require the Health and Environment Ministers to develop a national strategy to guide the safe development of nanotechnology based on the precautionary principle. It would include risk assessments before products can enter the marketplace and a public inventory of nanomaterials in Canada. This bill was not adopted into law.

Event	Who	When	Description
UK Government publishes Nanotechnologies Strategy: Small Technologies, Great Opportunities	UK Government	March 2010	The strategy was published following the Government's 2009 response to the Royal Commission on Environmental Pollution's report, <i>Novel materials in the Environment: The case of Nanotechnology</i> . It specifically suggests: a website to inform the public on Government nanotechnology work, a Nanotechnologies Collaboration Group, a Ministerial Nanotechnologies Leadership Group, and a new industry reporting scheme covering nanomaterials and products that contain them.
UK FSA accepts House of Lords Science and Technology Committee recommendation to implement a confidential database on nanotechnology research in the food industry	UK Food Standards Agency (FSA)	March 2010	The House of Lords committee argued that a database is necessary to steer the development of risk assessment procedures and to help set research priorities concerning the safety of nanotechnology. The recommendation called for mandatory industry participation. The FSA also accepted the recommendation that they create a public list of food and packaging products that contain approved nanomaterials.
The OECD releases updated guidelines for safety assessments of nanomaterials	Organization for Economic Cooperation and Development (OECD)	June 2010	This document updates early work on methodologies for assessing the safety of nanomaterials issued by the OECD on this topic. The original document, issued in 2009 is no longer available.
France adopts the Grenelle Law 2 requiring mandatory reporting on nanomaterials	Government of France	July 2010	Article 185 of French law 2010-788 (known as the Grenelle law 2) establishes mandatory reporting requirements for nanotechnology, including types of nanomaterials, uses, quantities, and the identities of the parties involved in their use.
EU Directorate General on the Environment commissions study on the creation of an inventory of consumer products containing nanomaterials	EU Directorate General on the Environment	July 2010	This study developed and tested a methodology for the creation of a database of consumer products containing nanomaterials. This was intended to explore the feasibility of creating a comprehensive database of these products at the EU level.

Event	Who	When	Description
The International Standards Organization issues a methodology for the classification and categorization of nanomaterials	International Standards Organization	August 2010	This methodology is intended to provide an international standard for the classification of nanomaterials and improve communications and interoperability of systems requiring this task and to reduce the duplication of efforts in this area.
World Technology Evaluation Centre publishes follow-up report on nanotechnology research priorities	World Technology Evaluation Centre	September 2010	The report entitled <i>Nanotechnology Research Directions for Societal Needs in 2020: Retrospective and Outlook</i> follows up on a 1999 publication issued by the U.S. National Science and Technology Council. It provides an updated assessment of research needs and opportunities given progress made from 2000-2010 and in light of evolving social needs.
US National Nanotechnology Initiative strategic plan is updated	United States Federal Government	February 2011	The US National Nanotechnology Initiative publishes an updated strategic plan .
Creation of Canada-US Regulatory Cooperation Council (RCC)	Canada and the United States	February 2011	Prime Minister Stephen Harper and US President Barack Obama agree to create a Canada-US Regulatory Cooperation Council (RCC). The purpose of this council is to increase regulatory transparency and cooperation between Canada and the United States. The RCC adopts a joint action plan that commits to sharing information and developing a joint approach on regulatory aspects of nanomaterials, including common terminology and risk assessment/management strategy.
US EPA introduces a Significant New Use Rule (SNUR) for multiwalled carbon nanotubes	US Environmental Protection Agency (EPA)	May 2011	Due to concerns about risks to human health and safety posed by multiwalled carbon nanotubes, the US EPA introduces a significant new use rule requiring 90 days advanced notice prior to the importation, manufacturing or processing of this material when involving a new use.
European Union publishes a directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment	European Commission	June 2011	This European Union directive calls on member states to examine the substitution of nanomaterials in electronic and electrical equipment for other substances as a precautionary measure against potential negative human health impacts that might result from exposure.

Event	Who	When	Description
Release of " Policy Principles for the US Decision Making concerning Regulation and Oversight of Applications of Nanotechnology and Nanomaterials "	White House	June 2011	This document proposes a set of principles for nanotechnology regulatory decision-making taking into account human health and environmental concerns with economic development and trade. They constitute an important policy statement from the executive branch of the US government on the topic of nanotechnology policy and regulation.
Release of Canada-US Regulatory Cooperation Council (RCC) Nanotechnology Policy Principles	Canadian Federal Government	June 2011	This document summarizes Canada's approach on principles for regulatory cooperation with the United States on nanotechnology. It is a response to the US document " Policy Principles for the US Decision-Making Concerning Regulation and Oversight of Applications of Nanotechnology and Nanomaterials ". The document is a product of the Canada-US Regulatory Cooperation Council established by Canadian Prime Minister Stephen Harper and US President Barack Obama in February 2011.
US Food and Drug Administration issues draft guidance for industry on deciding whether a regulated product constitutes an application of nanotechnology	US Food and Drug Administration	June 2011	This document provides FDA regulatees with a set of guidelines to determine whether or not their products are deemed to contain nanomaterials for regulatory purposes. This is intended to clarify requirements with respect to nanomaterials and to pave the way for additional product-specific guidelines to be issued by the FDA in the future.
Release of US Food and Drug Administration strategic plan " Advancing Regulatory Science at FDA "	US Food and Drug Administration	August 2011	The strategic plan commits to developing better analytical techniques and tools for the safety assessment of nanomaterials. It also commits the FDA to maintaining its readiness to assess safety concerns arising from novel materials and technologies.
US National Nanotechnology Initiative releases an Environmental, Health, And Safety Research Strategy	US National Nanotechnology Initiative (NNI)	September 2011	This document outlines the NNI's government-wide research plans and priorities for the risk and safety assessment of nanomaterials.

Event	Who	When	Description
European Commission adopts official definition of nanomaterials	European Commission	October 2011	The European Commission adopts a Recommendation on the definition of a nanomaterial . This non-binding document sets out a proposed definition of nanomaterials for member states.
Health Canada adopts “ Policy Statement on Health Canada's Working Definition for Nanomaterial ”	Health Canada	October 2011	In this document, Health Canada states its working definition of nanomaterials and lays out a strategy for coordinating its own internal efforts to collect and aggregate information on regulated nanomaterials, which will form the basis for communications and policy analysis on this topic.
The International Standards Association Releases a business plan on nanotechnologies	International Standards Association	December 2011	ISO Technical Committee 229 (TC229) issues a business plan highlighting activities with respect to creating international standards relating to nanotechnology.
EU issues communication on the results of second regulatory review on nanomaterials	European Commission	March 2012	This communication summarizes findings from the second EU regulatory review on nanomaterials, including risks, workplace safety, and innovation. It is accompanied by a staff working paper: “ Types and uses of nanomaterials and safety aspects ”.
US Food and Drug Administration issues draft guidances related to nanotechnology in cosmetics and food products	US Food and Drug Administration	April 2012	These FDA guidances provide product-specific guidelines on nanotechnology in food and cosmetics. They provide additional clarification for the food and cosmetics industries with respect to when products may be subject to regulatory oversight by the FDA.
US Congressional Research Service publishes a policy primer on nanotechnology	US Congressional Research Service	April 2012	The document provides an overview of nanotechnology policies, programs and regulations in the United States. There is a particular emphasis on describing activities of the US National Nanotechnology Initiative, and on selected issues such as competitiveness, the United States’ position in the field relative to other countries, and safety aspects.
Canada-US Regulatory Cooperation Council releases a nanotechnology work plan	Canada and the United States	May 2012	This Nanotechnology Work Plan specifies concrete objectives, deliverables and milestones for regulatory cooperation between Canada and the US on nanotechnology issues. Its overall goal is to establish, to the extent possible, common criteria for the regulation of nanomaterials.

Event	Who	When	Description
UK government creates the Nanotechnology Strategy Forum	United Kingdom	May 2012	The Nanotechnology Strategy Forum (NSF) is an ad-hoc expert advisory body established by the UK government to advise on policy and regulatory issues related to nanotechnology. It is chaired by the Minister of State for Universities and Science and the Parliamentary Under-Secretary for the Department for Environment, Food and Rural Affairs. Its membership consists of industry representatives, regulators and academics. It is scheduled to meet twice per year over 2013-2014.
Food and Drug Administration Safety and Innovation Act signed into law	United States Federal Government	July 2012	This Act includes several provisions authorizing the Secretary of Health and Human Services to pursue additional activities to assess the safety of nanomaterials in products and substances covered the mandate of the US Food and Drug Administration.
US EPA bans manufacture of potassium titanium oxide nanoparticles	US Environmental Protection Agency (EPA)	October 2012	The US EPA introduces new Significant New Use Rules for this substance banning the manufacturing of particles of less than 100 nm in diameter. The reason given for this decision is unacceptable risks to human health in cases of inhalation.
Health Canada releases a draft guidance document for industry on sunscreen including provisions on nanomaterials	Health Canada	November 2012	The draft document includes information on permitted doses and ingredients in sunscreen with specific requirements for nanomaterials.
OECD releases Guidance on Sample Preparation and Dosimetry for the Safety Testing of Manufactured Nanomaterials	Organization for Economic Cooperation and Development (OECD)	December 2012	This report updates the OECD recommendations about methodologies for the safety assessment of nanomaterials.
German Federal Environmental Agency announces support for a European Register of products containing nanomaterials	German Federal Environmental Agency (Umwelt Bundesamt)	December 2012	Citing the possible unknown health and safety risks of nanotechnology and the need for precautionary measures, the German Federal Environmental Agency publishes this report in favour of a European-level registry of consumer products containing nanomaterials.

Event	Who	When	Description
The Norwegian government introduces nanotechnology information requirements in its reporting scheme for chemicals	Government of Norway	January 2013	The Norwegian Climate and Pollution Agency posts a notice indicating new information requirements for nanotechnology in annual mandatory submissions for companies on chemical quantities and uses. As part of these requirements, companies are required to indicate whether substances consist of nanoparticles. Previously, there had been no distinction made between bulk and nanoscale substances in these submissions.
France publishes a preliminary report on its scheme for the mandatory reporting of nanomaterials	Government of France	November 2013	This report (only available in French) follows the implementation of a mandatory reporting scheme for nanomaterials that came into force in January 2013. As part of the requirements, industry must report all nanomaterials imported, produced and distributed and their uses when quantities exceed 100g. The report covers reporting from the year 2012.
European Commission adopts final report on the review of REACH	European Commission	February 2013	The European Commission publishes its final report summarizing its assessment of REACH guidelines for assessing the safety of materials. It concludes the REACH framework is performing well but prescribes additional work to clarify requirements for nanomaterials safety dossiers. It states these additional clarifications may be published in an amendment to REACH annexes and launches a public consultation on this subject.
The Canadian federal government publishes a Significant New Activity notice for multi-walled carbon nanotubes	Canadian Federal Government	August 2013	The Significant New Activity Notice indicates that multi-walled carbon nanotubes are subject to regulatory requirements under section 81 of the Canadian Environmental Protection Act. These requirements require a regulatory assessment prior to manufacture or import for the prescribed substances.
The European Commission Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) issues a preliminary opinion on the safety of nanosilver particles	European Commission Scientific Committee on Emerging and Newly Identified Health Risks	December 2013	Nanosilver particles are a common nanomaterial used in consumer products due to their antibacterial properties. The document constitutes a scientific expert assessment of the health risks associated with environmental exposure to these particles. The report is available here . The European Commission also launched a public consultation on this topic that concluded in February 2014.

Event	Who	When	Description
US National Institute of Occupational Health and Safety (NIOSH) publishes a nanotechnology strategic plan for 2013-2016	National Institute of Occupational Health and Safety	December 2013	The report outlines NIOSH's research goals with respect to assessing the safety of nanomaterials in a workplace setting for the period 2013-2016.
Launch of Horizon 2020 (European Union Eighth Framework Programme on Research and Technological Development)	European Union	January 2014	Horizon 2020 is the European Union's flagship program to support research and innovation. It brings previous EU research initiatives under a single umbrella and covers the period 2014-2020. Its Leadership in Enabling and Industrial Technologies stream includes a focus on nanotechnologies and other emerging technologies
Belgium announces the creation of a national register of nanomaterials	Belgium	February 2014	The Belgian government announces the creation of a national registry of nanomaterials coming into effect in January 2016 for nanomaterials in pure form and January 2017 for mixtures containing nanomaterials.
EPA introduces Significant New Use Rules (SNURs) with respect to multi-walled carbon nanotubes	US Environmental Protection Agency	February 2014	These rules provide additional information for industry on uses of multi-walled carbon nanotubes that are considered new activities and require the submission of pre-manufacturing notices to the EPA.
The US National Nanotechnology Initiative (NNI) publishes an updated strategic plan	US National Nanotechnology Initiative	February 2014	This report updates and replaces the NNI's previous strategic plan that was released in 2011.
The European Parliament adopts a resolution objecting to the European Commission's proposed definition of nanotechnology in food.		March 2014	The European parliament adopts a resolution objecting to the Commission's proposed definition, stating it would amount to a blanket exemption for labeling of nano-ingredients already on the market.

Event	Who	When	Description
European Chemicals Agency publishes a safety assessment best practice guide for nanomaterials under REACH	European Chemicals Agency (ECHA)	March 2014	EU REACH guidelines require the filing of a materials safety assessment dossier with the ECHA. This document provides a collection of best practices to ensure submissions to the ECHA meet the agency's requirements.
European Environmental NGOs publish a position paper about the EU's regulation of nanotechnology	Centre for International Environmental Law and others	April 2014	The position paper argues the EU's approach of assessing the safety of nanomaterials apart from bulk substances does not go far enough to address their risks. It calls for lowering the threshold for mandatory registration of a nanomaterials safety dossier with the European Chemicals Agency (ECHA) and the creation of a publicly accessible registry of products containing nanomaterials.

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Institute for Science, Society and Policy
Desmarais Building
55 Laurier Ave. East
Ottawa, Ontario, Canada
K1N 6N5

Address inquiries and comments to:
issp@uottawa.ca



uOttawa

issp.uottawa.ca