

Impact case study (REF3b)

Institution: St Mary's University College
Unit of Assessment: 32: Philosophy
Title of case study: Nanotechnology: ethics, dialogue, labelling
<p>1. Summary of the impact (indicative maximum 100 words)</p> <p>A national UK standard on nano-labelling has been published and an international standard is imminent largely due to the efforts of Professor Geoff Hunt as an applied ethicist in nanotechnology. Hunt became interested in the labelling of nanoproducts when he saw (in 2006) a lack of recognition that nanoscale hazards would affect consumers' right to know. He raised this in his 2006 co-edited book and at a UNESCO workshop in Paris (2007), leading directly to an invitation from Dr Peter Hatto of BSI (UK standardisation body) to lead a world-first initiative on nano-labelling. He continued to steer this project for five years up to International level.</p>
<p>2. Underpinning research (indicative maximum 500 words)</p> <p>The significance of labelling is one impact of Hunt's work in developing nanotechnologies, especially in the arena of safety, food, food packaging and medicine. The aim is to generate multidisciplinary awareness and investigation of the ethical implications of nanoscale complexity and uncertainty in order to influence risk policy and the labelling of consumer nanoproducts. This impact is relevant to policy making, economic prosperity and public services.</p> <p>Hunt founded the Centre for Bioethics & Emerging Technologies (CBET) in 2008 at St Mary's University College, with the specific role of developing ethical engagement with professionals and organisations in nanotechnology. He brought his skills to bear on conceptual issues of complexity, risk and uncertainty and ethical issues of safety, technological priority and the consumer's right to know (via labelling), having an impact on the European Commission's policy-making and professional debate.</p> <p>The insight underlying this case study is that emergent uncertainty and complexity should inform the debate about nanotechnology and its purposes, risks and benefits. At the nanoscale, many characteristics of substances such as Carbon or Titanium Dioxide change radically, and display 'emergent properties', both beneficial and hazardous. A reductionist and mechanistic paradigm still predominates in technology development, which hampers understanding of a very high and complex level of interactivity and reactivity, the generation of unpredictable emergent properties, some of which defy conventional means of characterisation and measurement, and hence generating unprecedented degrees of uncertainty, especially regarding safety and toxicity. There is an urgent need for a regulatory and testing regime beyond the conventional one. See:</p> <p>(1) FP7 NanoImpactNet (NMP-CA-2008-218539) 'Health & Environmental Impact of Nanomaterials', 48-month Coordinating Action (2008-2012) of European Commission, collaboration of 24 partners from 11 countries (later expanded) plus Joint Research Council (JRC), total funding 4M Euros, SMUC initial share was approx £51,000, later increased. See http://www.nanoimpactnet.eu/.</p> <p>(2) FP7 NaPolyNet (NMP3-CA-2008-218331), 'Setting up research-intensive clusters across the EU on characterization of polymer nanostructures', 2008-2011, 36-month Coordinating Action of EC, collaboration of partners from 10 EU countries (later expanded), and SMUC share was approx 34,000 GBP.</p> <p>(3) COST-FA0904 (Eco-sustainable Polymer Nanomaterials for Food Packaging), four-year European Cooperation on Science & Technology project, 2011-14, logistical expenses only, collaboration with 280 members in 33 countries.</p> <p>(4) BSI (UK standardisation body), with provision of all logistical expenses for work as BSI (UK standards) chair of working group on labelling of nano-products and subsequently as chair of joint European Committee for Standardization/ International Organization for Standardization project</p>

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group, 2007-2011.

Hunt also led an empirical research project to support the conceptual questions: a Delphi Method survey of a large group of safety and toxicology experts, which impacted as an outcome for the European Commission of 'NanoImpactNet' and as an academic paper, with Dr M Riediker.

3. References to the research (indicative maximum of six references)

Peer reviewed work:

1. Geoffrey Hunt, Iseult Lynch, Flemming Cassee, Richard Handy, Teresa F. Fernandes, Markus Berges, Thomas A. Kuhlbusch, Maria Dusinska, Michael Riediker (2013), 'Towards a Consensus View on Understanding Nanomaterials Hazards and Managing Exposure: Knowledge Gaps and Recommendations', Materials, 6: 1090-1117, ISSN 1996-1944, www.mdpi.com/journal/materials
2. Book Chapter: Matsuda, M., Hunt, G., Kuboki, Y., Ogino, T., Fujisawa, R., Watari, F., and Sammons, R.L., 'Protein Nanotechnology: Research, Development and Precaution in the Food Industry', chapter in Hettiarachchy, Sato & Marshall (eds), Food Proteins and Peptides: Chemistry, Functionality Interactions, and Commercialism, Taylor & Francis, Florida, USA, 2010.
3. Hunt, G. (2012) 'The Lambda Limit: The Incompleteness of Science', Journal of Biological Physics & Chemistry, 12: 121-28. [<http://www.amsi.ge/>]
4. Hunt, G. & Riediker, M (2011) 'Building Expert Consensus on Uncertainty and Complexity in Nanomaterial Safety', Nanotechnology Perceptions, 7: 82-98.
5. Hunt, G. (2008) 'Nanotechnology: Negotiating Global Priorities', Journal of Industrial Ecology (Yale U.P.), vol. 12, No 3, pp 275- 77.
6. Much of Hunt's work in this REF assessment period is a development of ideas in his earlier edited collection: Hunt, G. & Mehta, M (eds). Nanotechnology & Society: Risk, Ethics & Law. Earthscan, London, 2006, paperback 2008. This book was placed 9th in Top Ten Books (2007) by Ralph Nader, USA presidential candidate and consumers' right leader. [Chapters by G Hunt: chap 1, with Mehta, M. 'The Challenge of Nanotechnology'; Chap 5, 'Nanotechnoscience and Complexity'; Chap 6, with Matsuda M., & Obayashi O., 'Nanotechnologies in Japan'; Chap 8, 'Nanotechnologies in Europe'; Chap 15, Hunt, G. 'The Global Ethics of Nanotechnology'; Conclusion, with Mehta, M., 'What Makes Nanotechnology Special?'].

4. Details of the impact (indicative maximum 750 words)

Impacts include the entry of precautionary recommendations into EC coordinating action outcomes and right to know initiatives into international nanotechnology standardisation. These are set out in:

1. The BSI Publicly Available Specification on the labelling of consumer nano-products in print (see 5.1). Continuing initiative on the production of a joint European/International (CEN/ISO) standard, now imminent.
2. The publication, of which Hunt is the lead author (See Hunt, Lynch, Cassee et al, 2013) in the open access 'Materials' journal which proposes thirty-seven recommendations to the European Commission, many of which Hunt had a hand in clarifying, and in integrating and writing the whole document. (Note: Recommendations from a Framework project are taken into consideration by the EC, even though it rarely officially recognizes any policy changes directly resulting.) Among reports accepted by the EC is Riediker, M., Lynch, I., Hunt, G., Berges, M., Byrne, H., Clift,

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M., Rothen-Rutishauser, B., Tran, L., Fernandes, T., Kuhlbusch, T., Dusinska, M., Hart, D., Cassee, F (2012), NanoImpactNet: Final integrating scientific report. Available online: <http://www.nanoimpactnet.eu/index.php?page=reports>.

Consultations include written evidence to House of Lords Science & Technology Select Committee, on 'Nanotechnologies and Food', 2010, official report published; Royal Commission on Environmental Pollution, 'Novel Materials in the Environment', 2008, providing evidence on nano-pollution risk, official report published.

Non-academic publications include: 'Nanotechnology Ethics', Materials World 14(9) 2006: 36-37 in which Prof Hunt speculated about the priority of ultra-strong lightweight materials for wind turbine blades, which has now actually come to pass; with Nippres, K, 'Report on Nanotechnology and Airship Development, Airship: The Journal of the Airship Association (Dec 2006) Issue 54, pp14-17, in which he collaborated with an airship expert on the value of nanotechnology for new airship design as an environmental priority; 'The Labelling of Nano-Products', CHEManager Europe, a trade magazine for chemical engineers.

Hunt gave 26 invited lectures in the REF assessment period, in several EU countries and in Japan, for audiences ranging through the professional, scientific and academic to the secondary school level and general public. E.g.:

2008: Talk on nanotechnology risks at 'The Liability Crisis', professional and business seminar, Lloyds of London, 20th May;

2008: 'Nanomaterials: Is Measurement an Ethical Issue? National Physical Laboratory, Teddington, 9th July, about 70 scientists;

2009: Invited Keynote, 'Complexity Theory & Nanotechnology for Cosmetics', (in collaboration with Dr Maxim Ponomarev of University of Surrey), at AGM/General Assembly of European Cosmetics Association, Bled, Slovenia, 28th May, about 100 participants;

2010: Keynote on 'The Importance of Communicating REACH [regulations] and Nanomaterials Issues to Stakeholders: Labelling,' at European Conference on 'Nanomaterials: Risks, Regulations and Rewards', Lyon, France, 8- 10th September, over 200 participants.

2010: Invited presentation at 'High Level Conference on Nanosafety', Prague, Czech Republic, under auspices of the British Embassy Prague, the FP7 project NanoImpactNet, and Institute of Experimental Medicine of the Czech Academy of Sciences, et al. 29-30th Nov, about 100 EU participants

2010: Invited nano-ethics expert at Food Safety Authority (FSA) Citizens' Forum on nanotechnology and food, Hotel Campanile, Birmingham, 9th December.

2011: Lecture on 'Nanosafety' at meeting on 'Products, Privacy & People: Regulating at the Nanoscale', House of Lords, London, 28th Feb., about 50 high level multi-stakeholder participants ;
2011: Invited lecture on 'High Hazard Safety: Costs and Ethics' at workshop on 'The Cost and Ethics of Safety', seminar organised jointly by The Institution of Mechanical Engineers & The Safety & Reliability Society, Manchester, 24th May;

2012: Invited Guest Lecture on 'Intro to nanotechnology', at Charterhouse School, Godalming,

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Surrey to higher level students, 9th Feb.

Hunt has been a lead or co-organiser of all relevant parts of Management Committee meetings, communications and report integration for COST-FA0904 in the capacity of MC member and Chair of Work Package 4 on ethics, dialogue and standardisation, with 280 members in 33 countries. He has organised or co-organised nine events, most importantly: Hosted and organised at St Mary's University College the European Joint Technological Seminar of FP7-NaPolyNet & COST-FA0904 on 'Polymer Nanomaterials For Food Packaging: Characterization, Needs, Safety and Environmental Issues' as Management Committee member and Chair of Work Package 4 Ethics, Dialogue and Standardisation, with delegates from 17 countries, 1st-2nd September 2010.

Leaders of, and scientific participants in, these wide-ranging stakeholders have repeatedly informally given assurances that bringing a conceptual and ethical dimension has a significant influence on them and the projects (see Section 5).

5. Sources to corroborate the impact (indicative maximum of 10 references)

1. BSI Guidance on labelling at: <http://shop.bsigroup.com/en/Browse-By-Subject/Nanotechnology/Guidance-for-nanotechnology/>
2. Email from Standards for Innovation and Sustainable Development, Institute for Reference Materials and Measurements, Joint Research Centre of the European Commission European Joint Research Council regarding imminence of CEN/ISO standard on nano-labelling.
3. NanoImpactNet 'Final Scientific Report' to European Commission (2012), D.5.1e at <http://www.nanoimpactnet.eu/index.php?page=reports>
4. Chair of nanotechnologies projects in CEN/ISO at the time.
5. NaPolyNet Report to EC at: <http://www.scite.eu/index.php/links/napolynet> and http://cordis.europa.eu/search/index.cfm?fuseaction=result.document&RS_LANG=EN&RS_RCN=11481701&q= and <http://www.cnr.it/eventi/file/documento/id/7890> and <http://www.scientific.net/SSP.151.101>
6. COST-FA0904 presentations at: http://www.cost.eu/domains_actions/fa/Actions/FA0904manual [See "downloads"]
7. House of Lords Select Committee Report on Nanotechnologies and Food, (FSA 2010/03/06) <<http://www.food.gov.uk/multimedia/pdfs/board/fsa100306.pdf>>
8. Royal Commission on Environmental Pollution, 'Novel Materials in the Environment', 2008 <<http://www.official-documents.gov.uk/document/cm74/7468/7468.asp>>;
9. CheManager: www.chemanager-online.com/en/topics/chemicals-distribution/labeling-nano-products
10. Letters from project leaders are available on request.