



The insurability of nanomaterial production risk

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KBS
RESEARCH
BULLETIN

MAY 2013

15

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Authors: Elaine Doyle and
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Synopsis

There is an increasing realisation that one of the keys to the sustainability of the multi-billion dollar nanotechnology is its ability to transfer risk. The question of the insurability of the various stages of the life cycles of products that contain nano materials is attracting the attention of policy makers and industry stakeholders alike. Research conducted by KBS academics in conjunction with the MSSSI posits a way forward for insurers seeking to introduce more rigorous and scientifically based underwriting protocols.

Introduction and Background

Insurance has historically played a key but often unheeded role in innovative enterprises ranging from ocean voyages in the seventeenth century to the launch of modern satellites (Schoffski & Wegener, 2011). Insurance underwrites the inherent uncertainties associated with expedition, innovation and enterprise, and must occupy a crucial role in the development of nanotechnology (Rocco, Mirkin & Hersam 2011). Currently, there exists a great deal of ambiguity within insurance policies in relation to technologies that are based on nanomaterials (nano particles and nano fibres). Our role within the Sanowork Consortium (Community's Seventh Framework Programme FP7 grant agreement n° 280716, www.sanowork.eu) is to provide a bridging point between the scientific/industrial community and the insurance industry. There is an acceptance that the present situation whereby nanotechnology risk may be covered by general liability policies is less than optimal. In order for more clarity to be brought to bear, insurers need to be facilitated in the process of determining the risk represented by the heterogeneous activities associated with this emerging technology. This would allow insurers to determine which activities are suitable to be captured in general liability policies and those that might require a more bespoke approach. In some instances, it may be necessary for insurers to write exclusions into existing policies and generate specific add ons that will allow for risk transfer where a high degree of uncertainty remains present.

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Mullins, M., Murphy, F., Baublyte,
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(2013). "The insurability of nanomaterial
production risk", *Nature Nanotechnology*,
8, 222-224.
www.nature.com/nnano/journal/v8/n4/
full/nnano.2013.53.html
http://doi:10.1038/nnano.2013.53



Issues and Questions Considered

By way of providing some context; a nanometer is one-billionth of a meter, a red blood cell (erythrocyte) is approximately 7000 nm in diameter and an average sheet of paper is about 100,000 nanometers thick. Legal definitions of nanotechnology posit a length scale of approximately one to one hundred nanometers in any dimension. Nanotechnology, more generally, is described as manipulation of individual particles at the atomic-level. Anything that involves imaging, measuring, manipulating or manufacturing materials on the nanoscale can be termed as nanotechnology, in its broadest meaning. Technological innovation is largely driven by the fact that nanoparticles behave differently from their 'bigger cousins', that is to say, conventional materials of the same chemical composition. Herein lies the origin of the problem, nanoparticle have different characteristics to their parent material and many of their properties are only just beginning to be understood. Indeed, in many instances there is little consensus within the scientific community as to the risks they represent. Neither acute nor chronic exposure scenarios are well understood and there continues to be a dearth of standard operating procedures in the measurement of the exposure. It is workers in the sector that are the most vulnerable and their safety is the focus of the Sanowork project. In any risk calculation, exposure represents one axis and toxicity the other. Again here

the science on toxicity is somewhat ambiguous. That said, relatively recent research indicates that nanotubes (one of the most commonly used nanomaterials) might behave according to the fibre toxicity paradigm, drawing out the similarity between asbestos and carbon nanotubes (Poland et al., 2008). In the presence of so much uncertainty, there is an understandable reticence on part of the insurance industry to write nano-specific policies. At the same time, the absence of the any legal precedent or indeed a well-documented adverse event sustains the present "don't ask don't tell" arrangement

Methodology

UL researchers posit a control banding methodology to help overcome some of these difficulties. Such a control banding model, given the state of the science, would have to be iterative (Mullins et al 2013). The purpose of the model is to determine the insurability or otherwise of the risks posed to workers where nanoparticles are part of industrial processes. Such a model could be utilised by a range of actors including underwriters, risk managers, insurance buyers and the regulatory community. The control banding would capture not only the two principle risk axes, but also other important variables such as the training and regulatory regimes in place. Our researchers are working with both the London insurance market and the nanotech industry in the development of this model.

Outcomes and Findings

The tasks undertaken by UL researchers, in terms of facilitating the transfer of risk from the nanotech sector to the insurance industry, are perceived as vital - as evidenced by EU Commission funding and our recent publication in Nature Nanotechnology. We are at the early stages of developing and populating a control banding model and in the development of a sophisticated underwriting tool for this space. In term of outcomes, it is difficult to overstate the potential impact of this work. The nanotechnology sector cannot continue to rely on absence of the any adverse event in maintaining the insurability of the industry. If such an event occurs or the science begins to coalesce around a conclusion that suggests the nanotech sector represent a serious risk to those working in the sector or indeed to wider society then insurance may be hard to obtain or become prohibitively expensive. This could be put the whole industry on a less sustainable footing. Our work is important in that it represents a method by which risk perceptions in the insurance community can be better managed and hence risk transfer facilitated into the future.

This type of interdisciplinary work is underwritten by the presence of one of the relatively few insurance focused academic departments in Britain and Ireland and our world class research institute that is the MSSl.

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