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## Insuring Nanotech Requires Effective Risk Communication

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### Synopsis

The absence of nanotechnology-specific insurance policies could be detrimental to the development of the nanotechnology industry. Better communication between insurers and scientists is an essential step to provide a regulatory framework protecting both producers and consumers

of engineered nanomaterials. Should an adverse event occur there is a strong possibility that insurance companies will move to write exclusion clauses on nanotechnology related activities and this will threaten the economic viability and sustainability of nanotechnology enabled products and, more generally, nanotechnology research and development.

### Introduction

An ample literature set now exists around the sustainability of nanotechnology development, with researchers addressing the issue from a number of different perspectives including stakeholder or societal acceptance, risk communication and regulatory architecture. However, there seems to be little or no debate on the issue of insurance. This is due, in part, to the fact that researchers in nanoscience or nanotechnology are often unfamiliar with the operation of financial services such as insurance. They also often assume that because they have insurance policies in place, they need not worry about insurance specific to nanotechnology. Conversely, insurers have neglected to adequately interact with the scientific community detailing the extent of their concerns, even if this has been actively debated internally. Unfortunately, it is by no means clear that extant insurance policies actually capture nanotechnology related risk. Nanotechnology is currently insured under general liability policies that, while they do not exclude nanotechnology, do not necessarily affirm coverage leaving the indemnity issue somewhat murky. There has been some movement from the insurance industry including one attempt to exclude nanotechnology and some carriers offer nanotechnology specific coverage. In recent times several insurance companies have incorporated nano specific underwriting questions into applications. Secondly, for a number of years now, there has been an active debate in insurance circles on the acceptability of risks created by ongoing exposure to an ever increasing number

### A serious threat to nanotechnology

The lack of specific insurance policies creates the potential for situations that can seriously disrupt the industries employing nanotechnology. The emergence of a number of sub-optimal scenarios are possible and the propensity exists for serious disruption to those sectors. Let us imagine that an adverse event occurs and its origin is ascribed to nanotechnology. The insurance industry would react by excluding nanotechnology related activity from general liability policies and bespoke insurance coverage would become necessary for operators in the field. Such coverage may or not be universally available, with profound consequences in terms of the sustainability of impacted sector or sectors, especially if we consider that in many jurisdictions it is impossible to operate legally without a suite of insurance policies in place to protect stakeholders. These stakeholders include, workers, the general public, consumers and indeed the environment. Insurance business lines are fashioned in such a way as to address these particular risk categories, hence the existence of employer's liability, public liability, product liability and environmental liability. The reality is quite stark, in many parts of the world, without these sets of coverage, those industries that employ nanotechnology may not be able to operate.

The manufacture and use of nanoparticles, among other activities, are seen by insurers as an emerging risk. This categorization of emerging risk underlines the absence of actuarial type data sets on which

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insurers usually rely in order to measure potential loss exposure. There exists then, a data lacuna, meaning that insurers are essentially operating at the level of risk appetite rather than relying on the more familiar statistical approach using historical claims data. In this context, the potential exists for insurance coverage of the nanotechnology related activity to become prohibitively expensive and not universally available. Without insurance as a mechanism for risk transfer, industry is exposed both legally and financially. To sum up the current situation, the development and exploitation of nanotechnology may only be an adverse event away from being vulnerable to disruption. Once insurance cover becomes a potential problem, there are a number of downstream effects including legal restrictions and financial/funding constraints. This risk needs to be mitigated and the nanotechnology scientific community has a key role in this regard in that only they can provide the expertise needed to allow regulators and insurers to identify low risk nanotechnology related activities.

### Insurers' perceptions of Nanotechnology

The relative absence of an overarching regulatory and legal framework means that the nanotechnology scientific community occupies a key risk communication function. The need for reassurance becomes clearer within the larger context of concern over exposure to potentially catastrophic risk. Some of the earliest concerns of the insurance sector surfaced in the early 2000's with a several reports on the matter. These and subsequent reports were largely prompted by the asbestos crisis, the single largest insurance loss in history of \$90 Billion. Uppermost in insurers' minds is not only the severity of a possible risk but also the timeline of that risk, what insurers refer to as long-tailed liability risk. Long-tailed liabilities are those claims that are not settled for several years after the expiration of the policy.

Adding to the uncertainty for insurers, neither the US nor the EU have implemented a unified regulatory definition of nanomaterials. Current definitions are advisory and where regulations exist the definitions cover specific areas e.g. cosmetics or food. Further, they often do not address key nanomaterial descriptors beyond size. An advisory or recommendation serves as a guideline only and is not legally binding until it is incorporated into legislation. In regulatory terms, the rationale for the development of such a definition resides with balancing the uncertainty about the safety of nanomaterials for human and animal health and the environment with the free movement of goods and legal certainty for manufacturers.

The lack of regulatory convergence or the absence of any requirement to respond to nano-specific questioning on insurance applications can mean that supply chain risk remains unknown. Nano materials are incorporated into many products, so legal issues and coverage issues will likely arise in determining responsibility and liability. The lack of an agreed definition means that it is possible that claims have already been paid that relate to nanotechnology but have not been identified as such. In addition to relying on actuarial data, the insurance industry relies on regulations to define minimum safety parameters, however the regulatory framework is still nascent in the EU, US, Asia and the rest of the world.

Returning to the uncertainty of associated long-tailed liability risk. It is unlikely that a nanomaterial-catalysed event will exhibit one single clear causality link, latency pattern, human and environmental harm. The salient point here is that due to a lack of rapid communication between science, regulators and insurers, any insurance assessment will lack the required nuance and because of their institutional memory, they will treat nanomaterials as one homogenous risk and withdraw coverage for fear of major losses. Albeit disproportionate, insurance coverage may be withdrawn with attendant economic disruption.

### Ways Forward

Insurers are using advances in technology to improve predictive risk modelling. Insurers are already advanced practitioners in applying computer science to access and interrogate big data developed by researchers to learn, band or group, interpret and track risk. For these solutions to work for nanomaterial risk, data funded and produced by national and supranational research groups must be made publically available and accessible. Although this is implicit in recent funding frameworks, it remains a prerequisite for further data analytics. Regulatory concerns are closely related to those of the insurance industry and a closer collaboration between underwriters, regulators and the nanotechnology industry is overdue.

Quantifying emerging risks such as nanotechnology, biological engineering, global warming, etc. is difficult but achievable. For nanotechnology, control banding frameworks have been proposed but at the moment, robust models are not widely available. At the same time, changes in regulatory regimes mean that insurance companies are required to produce transparent, quantitative measures of their exposure to losses across their business lines. Control banding solutions must be pursued systematically and developed in order to capture the current range of inconsistencies in characterisation, toxicological measurement and exposure tests. This approach can capture expected human and environmental risks. For more esoteric risks a combination of big data analytics and having access to an ever increasing body of research may offer a partial solution in that they could permit the prospect of creating an early warning system for stakeholders. This innovation would have the effect of avoiding across the board nanotechnology exclusions as it would afford insurance underwriters a degree of security. Thus, we would move from a scenario in which risk perception was the dominant phenomena to one where risk classification became the operational basis of risk transfer.

Globally, governments and regional organisations have invested billions of dollars into nanotechnology research rightly incorporating risk assessment and management as a major component of that research. However, in most cases risk assessments have failed to capture the views or indeed the needs of risk underwriters. Scientists in the field need to help insurers to continue to underwrite the technology and ensure the continued economic sustainability of nanotechnology and nanotechnology enabled products.

The research leading to this article has received funding from the European Community's Horizon 2020 Programme under grant agreement no. 720851, PROTECT ([www.protect-h2020.eu](http://www.protect-h2020.eu))

**The underlying study was published in Nature Nanotechnology (12), 2017, and a copy may be obtained at:**  
<https://www.nature.com/articles/nnano.2017.162.pdf?origin=ppub>

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