

# Deliverable Report

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# 1 Summary

Gov4Nano Tasks 3.2 and 3.3 had initially planned to develop a tailor-made information service regarding the developments in understanding the risks posed by nanotechnologies; the service would form an integral part of the Nanotechnology Risk Governance Council (NRGC). In order to achieve this, the WP3 team was to first conduct an in-depth *'[r]eview of the (re-)insurance industry's knowledge about and provisions towards nanotechnology and its applications'*, subsequently set *'[...] indicators, developing and conducting dedicated interviews with targeted (re-)insurance industry companies, in order to improve the group's knowledge and support of nanotechnologies'* (cf. Gov4Nano DoA: Task 3.2), and then *'[develop and conduct] training and education activities with (a) civil society, and (b) (re-)insurance industry, putting emphasis on out-of-the-box thinking'* and *'[evaluate] the risk perception indicators and [provide] feedback to Task 3.1 and 3.2'* (cf. Gov4Nano DoA: Task 3.3).

After nine months of dedicated presentations and engagements with representative of the (re-)insurance industry, however, it became clear that nanotechnology was not high enough on their agenda to dedicate any time to it. A single insurance expert, who had agreed to an interview with the Gov4Nano WP3 team explained that the insurance industry had not lost interest in nanotechnology, but the understanding was that the 'nano'-label was no longer needed.

It was thus agreed to conduct a review of the (re-)insurance industry's initial interest in and active engagement with nanotechnology in the early 2000s, and the developments in the field in the subsequent 15 years. It became clear that the industry's initial interest had been caused by a number of reasons, ranging from the genuine worry that the uncertainties and 'unknown unknowns' surrounding nanotechnologies would render the technology entirely 'uninsurable' (i.e. similar to nuclear worst-case scenarios), to the view that nanotechnology harboured lucrative growth opportunities in the form of novel commercial and industrial insurance covers and defence costs. While some insurance companies decided to react to the former with the announcement of 'exclusions' of all nanotechnologies (with a focus on nanomaterials) from their policies, their opportunist counterparts responded to the latter by offering new, nanotechnology-specific policies; the majority of (re-)insurance companies, however, decided to hold dialogue meetings with experts and laypeople, conducted in-depth analyses of nanotechnology and its risks, and subsequently set up nanotechnology-monitoring activities.

The ongoing advancement of nanotechnology-based processes and products over the past 20 years demonstrates that nanotechnologies could be covered by commercial and industrial insurance policies, and that even incidents like that of Magic Nano (i.e. a bathroom sealant spray that had hospitalised around 100 users with (sometime severe) respiratory problems upon inhaling the product's aerosol) did not lead to any nanotechnology-specific losses. The insurance industry did, however, treat the *Magic Nano* incident as a 'wake-up call' to the entire nanotechnology community, in that it learnt to give a higher weighting to the reputational risks of a technology, and to consequently emphasise analyses of reputational damage exposures and crisis communication.

The Gov4Nano WP3 team, too, decided to re-focus the activity of Task 3.1 and Task 3.3 to support the development of crisis-management and -communication procedures and recommendations.

## 2 Description of task

Task 3.2: Information needs and communication with (re-)insurance industry

Lead: AIST, Contributors: RIVM, NIA, TEMAS, BNN, SOLVAY

Task 3.2 will focus on insurance and re-insurance companies, who play a pivotal role in the consideration and the decision-making regarding risk acceptance and risk transfer. Previous market studies carried out by TEMAS and others (NanoReg2 D3.9 Hoehener et al in preparation) have shown that insurance companies were one main group showing an incipient interest in the uncertainties brought by nanotechnology-inspired products. This particular group of professionals plays a key role in the market and business exploitation of nanotechnology-based products and has only been considered as a high interest group recently. Their information needs are different from other sector-based groups since these are transversal (risk assessment of process and products alike) and thus require a wider expertise including risk assessment, socioeconomic analysis, and public risk perception.

This Task will review the (re-)insurance industry's knowledge about and provisions towards nanotechnology in general and nanotechnology-enabled products for Business to Business (B2B) and Business to Consumers (B2C) applications in particular. Expert interviews and surveys will be developed [in part informed by previous reports, such as those discussed in detail in the following report], ultimately yielding detailed catalogue of the insurance industry's needs and views with regard to information about nanotechnologies and nanotechnology-related risks; identified needs that require external action will be formulated in the form of (research) recommendations.

This Task will be conducted in collaboration with Subtask 3.3.2, which aims to identify and subsequently address the insurance industry's own needs for information, training and information dissemination. The strong involvement of the Swiss-based company TEMAS will ensure that this sector is addressed appropriately, building on existing contacts to insurance and re-insurance companies (e.g., Swiss Re, Allianz Risk Transfer AG, SCOR Global Life Rückversicherung Schweiz AG, Echo Rückversicherungs AG, etc.).

Key actions:

- i. Review of the (re-)insurance industry's knowledge about and provisions towards nanotechnology and its applications.
- ii. Setting indicators, developing and conducting dedicated interviews with targeted (re-)insurance industry companies, in order to improve the group's knowledge and support of nanotechnologies.

## 3 Description of work & main achievements

### 3.1 Background of the task

Civil society and (re-)insurance companies have to deal with high uncertainty about risks of nanotechnology. It is important to identify, analyse and understand their needs. WP3 focusses on the characterisation of how risk perception is formed in (a) in civil society, and (b) (re-)insurance industry. Specific focus will be given to identifying the particular information needs of these two specific stakeholder groups.

Starting from the general public perception about nanotechnology and its application in different products, WP3 aims to identify indicators that influence risk perception, to define criteria that form different perceived risk levels, and to understand how risk information is communicated and received by an individual. Moreover, WP3 will elaborate how training and education can help that non-experts to build their own unbiased opinion. Based on the identified indicators and criteria, WP3 will elaborate and integrate into the NRGC the structure on (a) how to involve and take into account civil society and (re-)insurance industry needs and views, and (b) how to monitor the successful interaction with these stakeholders. WP3 will analyse best practices of crisis communication, involve experts of crisis and consumer communication by means of interviews and workshops, and will conduct dedicated training and education activities. Moreover, the monitoring of public perception along the project runtime will help to evaluate and analyse the different engagement activities.

Thus, WP3 will lead to a better understanding of needs and concerns about nanotechnologies in (a) the civil society and (b) the (re-)insurance industry, informing the NRGC work according to current and future changing situations in civil society. Derived from these actions the "civil society pillar" and the "insurance pillar" will be developed and maintained within the NRGC.

Findings of Task 3.2 will feed into WP5 to ensure that insurances' needs are appropriately addressed through the NRGC, including the "regulatory roadmap exercise" (Task 5.2). Moreover, this Task will collaborate with WP6 and contribute to the overall stakeholder engagement framework.

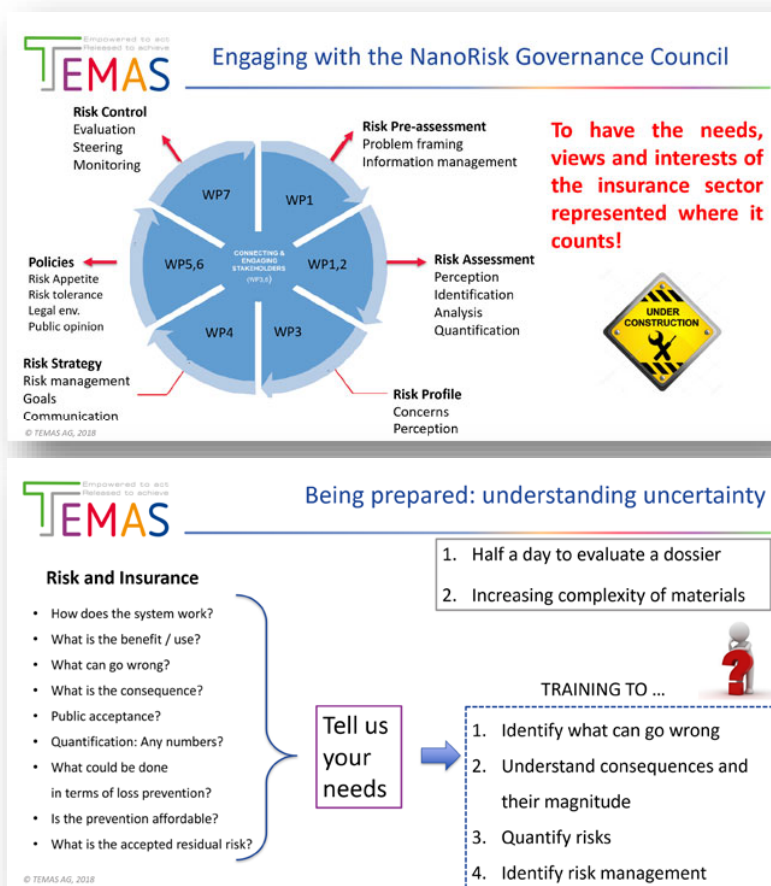
### 3.2 Description of the work carried out

Gov4Nano Partners contributing to WP3 tried to find representatives of the insurance industry that were interested and available to work with the Gov4Nano project regarding its plans to (a) analyse the insurance industry's knowledge about nanotechnology and its practices applied to ensure nanotechnology products and processes (Task 3.2), and (b) provide tailor-made information and training to the insurance industry (Task 3.3, Sub-Task 3.3.2). TEMAS, in particular, made contact with an association of insurers and re-insurers and tried to arrange further contacts for the conduct of Task 3.2 through the association.

Figure 1 shows an excerpt of two slides from a presentation that TEMAS delivered at a meeting of an insurance industry association in Switzerland.

By October 2019, however, it became clear that the insurance industry was not interested in working with the Gov4Nano Project; the industry no longer had strong need or interest to find out more about nanotechnology, because the industry felt that it could effectively insure nanotechnology-based products and processes within the existing policies applied to chemical, materials and engineering companies.

As a result, the Gov4Nano Task 3.2 and Task 3.3 changed their focus and operational workplan: the Deliverables D3.3 (*Report on the (re-)insurance industry's knowledge about and provisions towards nanotechnology and its applications and on the industry's information needs (M17)*) and D3.4 (*Report on information needs of the (re-)insurance industry (M36)*) would be merged into a single report, which would focus on explaining the history and development of the (re-)insurance industry's engagement with nanotechnology, and explain its established (and now largely routine) treatment of nanotechnology-based products and processes. No training of the (re-)insurance industries would take place in Task 3.3; instead, Task 3.4 would ensure that all results from T3.2 would be taken into account for the NRGC design and its (re-)insurance pillar.



**Figure 1: Excerpt from a presentation delivered by TEMAS at a meeting of an insurance industry association in Switzerland, June 2019.**

### 3.2.1 Longitudinal Analysis of the (Re-)Insurance Industry's Interest in and Engagement with Nanotechnology

AIST conducted a desk-based study of the engagement of the (re-)insurance industry with nanotechnology, starting in the early 2000s and ending with an interview with a Risk Engineer for Allianz Global Corporate & Speciality (AGCS), who had covered nanotechnology-based products and processes as part of his responsibility for risk assessment pertaining to environmental and social governance on behalf of the underwriter; the engineer had also served as an adviser to the CALIBRATE project. AIST's initial findings were discussed with the expert during the interview in October 2019.

## 3.3 Results

At the beginning of the millennium, the insurance industry (and its re-insurers) started to become increasingly engaged in assessing a new technology that was being celebrated as the solution to many, if not all technological and societal problems, and that was thus included in an increasing number of small- and large-scale commercial processes and products:



nanotechnology. According to both the word on the street and in the R&D laboratories at the time, nanotechnology and its most ubiquitous embodiment, the 'nanomaterial' (AKA 'nanoparticle' or 'quantum dot'), could not only be used in every existing industry sector from agriculture to anticounterfeit and to high-tech computing, but it would also give rise to entirely new market sectors. Moreover, scientists and technologists confirmed that the new technology was already being utilised (both deliberately and inadvertently) in numerous processes and applications, such as sunscreens, modern transistors and printing technologies, which were all based on nanoscale-phenomena through the processes or materials they were applying. In light of this, everybody connected to the commercialisation of this new technology had reasons to be nervous:

- What made the (re-)insurance industry nervous was the fact that nanotechnology was not distinguishable from other technologies, because both nanoscale-phenomena and so-called nanomaterials or nanoparticles frequently occurred naturally (e.g. soot particles arising from forest fires, nanoscale structures that create colour effects on the wings of a butterfly) or as by-products of natural or anthropogenic processes (e.g. ultra-fine particles released by fires or from combustion engines, carbon-particles from car tires, released through abrasion on the road surface).
- What made R&D and industrial experts nervous was the increasing evidence that everybody could have a try at doing some nanotechnology or creating some nanoparticles: milling-, ablation, or combustion-processes could be set up by anybody with a technical inclination, and could subsequently release plumes of colourless and odourless volatile substances, about which experts of environment, health and safety (EHS) and occupational health and safety (OHS) alike uttered an increasing number of worries regarding their unknown and increasingly known and understood (potential) effects; the most impactful (and most studied) of these effects, at the time, was based on the similarity of carbon nanotubes (i.e. one of nanotechnology's flagship materials, celebrated as the lightest and strongest material on earth) with asbestos, and the consequential conclusion that carbon nanotubes could cause the same (or similar) health effects as the proven carcinogenic asbestos.

### 3.3.1 The Concept of Insurance

In the face of these worries (and in many ways attributable to them), the advancement and commercialisation of nanotechnology could continue through the support and collaboration of the (re-)insurance industry only, because '*insurance is the institution of governance beyond the state*' (Ericson, Richard, et al., 2003); '*[it] is crucial for governing the everyday world of safety and security.*' (Ericson, et al., 2004) Insurance sociologists argue that in these '*[i]nsurance-driven systems of governance [it is presumed] that all chance can be tamed and that all risks are moral*' (Lippert, et al., 2006; Ericson, Richard, et al., 2003); according to these sources, the underlying approach used by the insurance industry to tame the risks and chances was based on framing the risks as calculable and pooling the insured together according to their risk profiles. The insurance industry thus acted like an 'agent' for the individual insured companies, who would otherwise be helpless against the risks, as explained in Box 1.

The insurance industry assesses risks by means of mathematical and statistical methods, collectively described as **actuarial analysis**; this is a probabilistically calculus based on the frequency and severity of losses that uses knowledge about other disciplines, in order to develop statistically based ideas of **normalcy**; what is normal becomes also the moral norm.

All insurance approaches, however, are based on the basic assumption that the costs of prevention must be lower than the expected losses.

In the case of new risks, entirely new scenarios of losses are possible, so that statistical analysis cannot be used to calculate the cost of losses; this '**risk of change**' is carried by new technologies by introducing changes to the dimensions of injury and damage, and well as third-party liabilities, effectively giving rise to an underlying risk of 'control(un)ability'.

**Box 1: Principles of Insurance (after (Lippert, et al., 2006)).**



### 3.3.2 Insurers and their Re-Insurers

A re-insurer steps in to underwrite the risks of large financial losses at the part of its insurance industry clients; it is thus interested in large-scale, catastrophic risks. New phenomena, technologies or developments, for which no actuarial approach can be derived, require analyses by the re-insurance industry, in order to provide general frameworks and guidance to their clients in the insurance industry (Ericson, Richard, et al., 2003). The 'ultimate underwriter', however, remains the state; this is the case for nuclear technologies (Lippert, et al., 2006).

The re-insurer Swiss Re counts so-called 'phantom risks' (i.e. *'a phenomenon, which is perceived by the population as a threat, although no scientifically demonstrable casual connection can be established'*) (Swiss Re Group, 2004b) as one of the biggest potential reasons for losses in nanotechnology. In its 2004 report, the re-insurer notes that *'[i]n contrast to the debates on nuclear power and genetic engineering, the public does not yet view nanotechnology as a noteworthy threat. [...] No question, however: nanotechnology will sooner or later emerge as a public issue.'*

The Allianz Group dutifully adopted the recommendation coming from the re-insurance industry and pledged to *'Allianz wants to contribute to a dialogue-oriented approach using sustainability as both a vision and a yardstick of success.'* (Allianz Group, et al., 2005)

Between 2004 and 2010, numerous events (co-)organised by the (re-)insurance industries invited nanotechnology experts and laypeople alike, in order to understand nanotechnology and stay up-to-date with new developments and knowledge pertaining its, and to regularly elucidate the public perception of nanotechnologies.

In 2004, the (re-)insurance industry established a precompetitive platform, in order to approach the challenges introduced by emerging risks in a collaborative manner: the CRO Forum.<sup>1</sup>

The CRO Forum describes its core aims as:

1. *Championing best practice in risk management to advance business;*
2. *Alignment of regulatory requirements with best practice in risk management; and*
3. *Providing insights on emerging and long-term risks.*

Under its 'Emerging Risks Initiative' (ERI), the CRO Forum published an in-depth position-paper on nanotechnology in 2010; the paper concluded that *'the insurance industry seeks to foster opportunity while not ignoring the risks associated with nanotechnology. The insurance industry's primary interest is to achieve a greater understanding of nanotechnology hazards in order to promote risk awareness, risk management and above all, insurability.'* (CRO Forum, 2010)

Figure 2 illustrates the (re-)insurance industry's pre-competitive collaboration within the CRO Forum's ERI Initiative as a function of the emerging risk process.

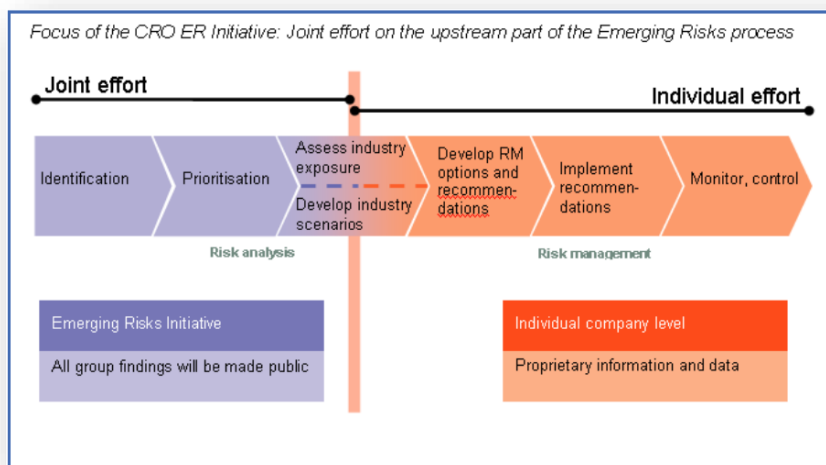
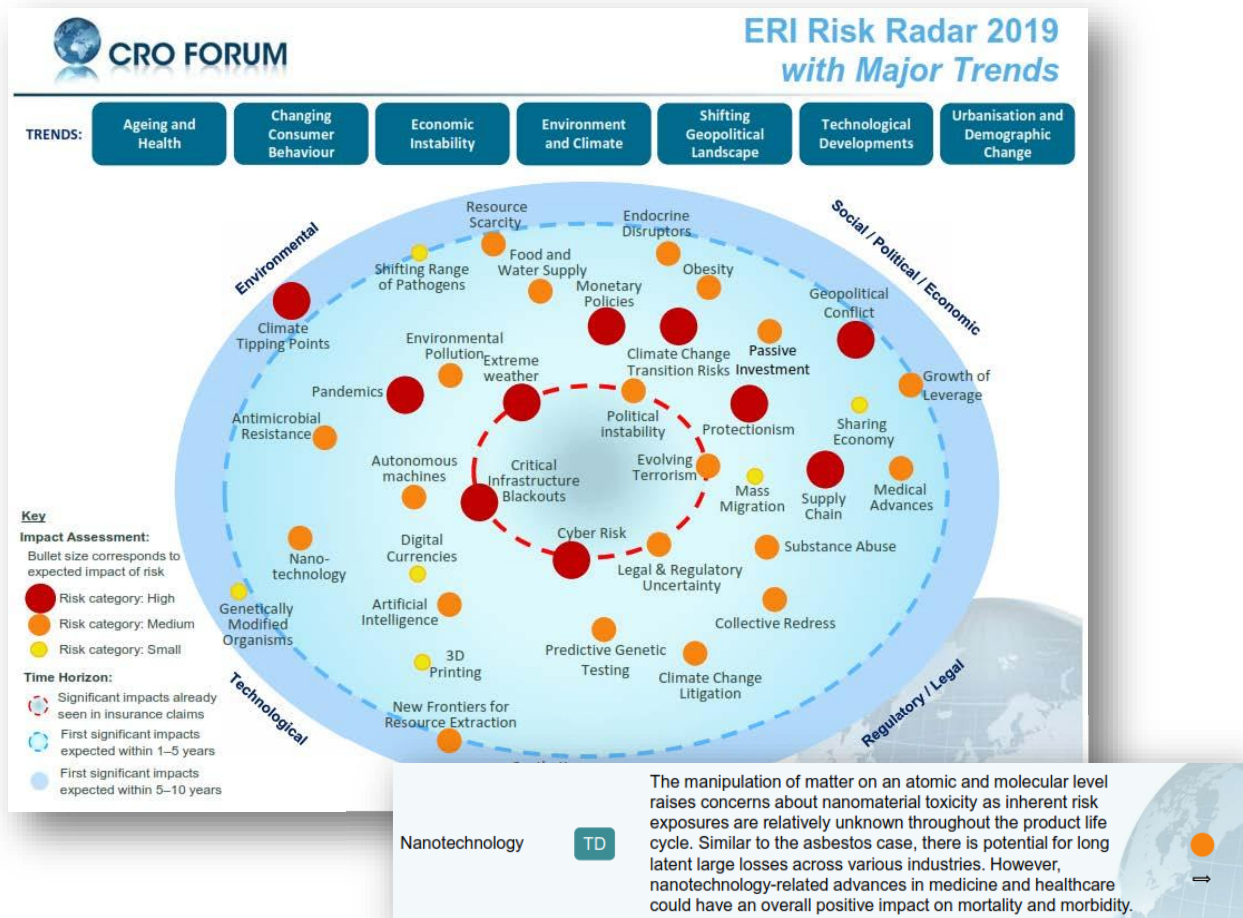


Figure 2: Illustration of the CRO Forum's ERI (source: (Bruch, 2012))

<sup>1</sup> <https://www.thecroforum.org/> (accessed: 4<sup>th</sup> June 2020)

In its 'ERI Risk Radar 2019' annual update, the CRO categorised the risk posed by nanotechnology as 'medium', featuring it as a risk that is largely of 'technological' nature, and whose first significant impacts were expected within one to five years, as illustrated in Figure 3 (CRO Forum, 2019).



**Figure 3: Excerpt from the 'CRO ERI Risk Radar 2019'; the small inset on the right is a reproduction of the CRO Forum's description of nanotechnology (TD = 'Technological Developments' (associated trends)) (source: (CRO Forum, 2019))**

### 3.3.3 Nanotechnology - Challenges and Opportunities for the Insurance Industry

As explained above, in the case of new technologies, the '*scientific and technical knowledge for actuarial precision is limited and equivocal*' (Ericson, Richard, et al., 2003); nevertheless, many insurers underwrite the risks of new technologies anyway, because they regard the economic logic as superior to the scientific logic of risks. (Lippert, et al., 2006) Moreover, many insurance firms frequently regard new technologies as opportunities to inhabit niche markets to insure against new and potentially catastrophic kinds of damage (Lippert, et al., 2006).

In this light, the insurance industries' rapid and intensive engagement with nanotechnology between 2002 and 2006 was driven by and resulted in variety of opinions and strategies, ranging from the Munich Re Group's verdict that nanotechnology was 'uninsurable' to the concept of nanotechnology-insurance through 'case-by-case' approaches and 'distributed responsibilities', as advocated by the Allianz and the Swiss Re Groups (Allianz Group, et al., 2005; Swiss Re Group, 2004b).

**Table 1: Main Arguments for and against the insurability of nanotechnology**

<p><b>PRO: Insurability of Nanotechnology</b></p> <p>In 2004, the Geneva Association found that <i>'Nanotechnology is "insured" today in the sense that it is not excluded from most insurance treaties.'</i> (Swiss Re Group, 2004a)</p> <p>The Swiss Re Group and the Allianz Group note that the question should not be whether nanotechnology was insured, but how it was insured (Swiss Re Group, 2004b; Allianz Group, et al., 2005): <i>'From the available evidence, we believe that the question is not whether or not nanotechnology risks can be controlled – and insured – but rather how they can best be managed and insured in a responsible way.'</i> (Allianz Group, et al., 2005)</p> <p>Allianz Group continues by asserting that <i>'Allianz has a wide range of measures at hand to optimally manage the risk and "sculpt" a portfolio. The appetite for certain classes of risk can be defined, and details of coverage can be tailored, both to meet client demands and protect Allianz's assets.'</i> (Allianz Group, et al., 2005)</p> <p>Both insurers find that nanotechnology represented a significant opportunity for all industry sectors (including the insurance sector); in order to support the ongoing advancement of the technology, they relied on a model of 'distributed responsibilities' that was largely enabled by a step-wise, dialogue-oriented approach of designing <i>'nanoinsurance-policies [in] a partnership between the economically enabling insurance industry and the technologically enabling nano-industry.'</i> (Lippert, et al., 2006)</p> <p>The re-insurer Swiss Re Group concluded: <i>'Dialogue is needed among science, industry, the authorities and the public. As the risk carrier, the insurer carries the responsibility for leading the risk dialogue, including with lawmakers.'</i></p>
<p><b>CONTRA: 'Uninsurability' of Nanotechnology</b></p> <p>In its 2002 report, the Munich Re Group found that nanotechnology could not be insured, since losses were not estimable and premiums or rebates could not be calculated (Lippert, et al., 2006; Munich Re Group, 2002).</p> <p>Munich Re noted that <i>'[t]he application of nanotechnology products and processes could bring about a whole new dimension in personal injury, property damage and pure financial losses as well as third party liability risks, for instance in product, environmental and third-party liability. From the underwriting point of view, this "risk of change" arises because, as scientific knowledge increases, so defects are discovered which are hidden in new products or processes. This leads to – fundamentally new types of loss scenario, for example (resulting from new material properties, such as magnetic fluids), which did not exist in the past, – exponentiation of existing loss potentials (incidence and major claims risk), – more stringent bases of liability, as a result of changing legislation and jurisprudence, – a new concept of damage resulting from a change in the socio-political or socio-economic environment. This applies particularly because under liability law in many countries, third-party liability does not depend only on whether the apparently responsible party is at fault (fault-based liability). On the contrary, such liability also exists in cases where neither user nor manufacturer of nanotechnology products and processes had reason to foresee a risk of loss and where they were acting in accordance with the state of the art and science applicable at the time (no-fault liability).'</i></p> <p>The Munich Re group added that the lack of traceability (and thus assignment of responsibility, liability for damage and loss) posed the largest problem with regard to the insurability of nanotechnology: <i>'For example, it is probably going to prove difficult to label nano products with their origin and producer, although it is something which is already feasible. This would mean that, in the event of a loss, it would not always be possible to trace the manufacturer responsible.'</i> (Munich Re Group, 2002)</p> <p>By way of a conclusion, Munich Re likened the potential loss scenarios introduced by nanotechnology to that of 'nuclear accidents: <i>'A similar problem could arise from the threat of nanotechnology to natural resources, on a scale comparable only to that of nuclear accidents. If set free un- controlled nano robots could, with the necessary constant power supply, transform organic substances in the environment into new materials or penetrate into the soil, causing permanent damage to crop cells or even destroying them. These would be totally new loss scenarios, likely to go far beyond anything experienced up to now in today's hi-tech world.'</i> (Munich Re Group, 2002)</p>

The analyses, engagement and subsequent action of the Allianz Group best reflects the opinion of the majority of (re-)insurance companies: in its 2005 report, the Allianz Group concluded that *'[w]hile it is still too early to make conclusive statements, our own risk management will have to put its feelers out' on the subject. ... the process of adapting to new technologies is, in fact, a balancing act of risk-taking by limiting transaction costs, improving the evidence base and coping with a degree of uncertainty.*' (Allianz Group, et al., 2005) The report suggested the following approach to nanoinsurance:

*For a successful risk management of nanotechnologies from our perspective, the following framework is needed:*

- *sufficient funding of independent research on nanotechnology related risks with active steering by governments,*
- *transparency about and open access to the results of research activities,*
- *ongoing dialogue between insurers and commercial and industrial clients,*
- *international standards and nomenclature,*
- *adequate regulation of risk issues,*
- *a global risk governance approach.*

#### 3.3.4 *Polarised Responses by the Insurance Industry*

Considering the (re-)insurance industries' self-proclaimed role in the transfer of technological and societal risks into monetary values, the outspoken (albeit careful) support for nanotechnology by the Allianz and Swiss Re Groups must be seen in the light of the opportunities the insurance sector saw in nanotechnology at the time.

As predicted by Munich Re, however, insurance companies that operate in jurisdictions with tort law (or liability law) systems surprised even their industry peers by either going for sweeping policy exclusions of nanotechnology, or bold new nanotechnology-specific policies:

##### **Nanotechnology-specific exclusions**

The US insurer Continental Western Insurance Group issued what appears to be one of the first nano-specific commercial insurance exclusions in September 2008; the law firm Porter Wright was quick to publish an analysis of the exclusion, noting that *'[a]lthough Continental originally posted the exclusion and two supporting documents on its website, the materials were removed after BNA published an article about the exclusion this morning.'* The law firm finds that *'[r]ather than excluding all "nanotechnology," Continental more likely meant to exclude all nanoscale materials. Even then, such a blanket exclusion would be extremely broad because many nanoscale materials have not been shown to pose any environmental, health, or safety risks.'* (Porter Wright, 2008)

Not long after the initial exclusion appeared (and disappeared) in November 2008, the US Insurance Services Office Inc. was found to have issued language purporting to exclude coverage for bodily injury, property damage, and personal and advertising injury *'related to the actual, alleged or threatened presence of or exposure to 'nanotubes' or 'nanotechnology' in any form, or to harmful substances emanating from 'nanotubes' or 'nanotechnology.'* This was reported by two lawyers, aiming to inform businesses about potential consequences of such exclusions; it warned that *'[a]t least one insurer announced it intended to add the exclusion to its policies [...].'* (Bennett, et al., 2008)

##### **Nanotechnology-specific insurance policies**

Meanwhile, some insurance companies saw an opportunity to develop and sell special 'nanotechnology insurance policies', which promised to examine a company's business plan and to undertake an appraisal of all insurable risk, so that an insurance portfolio with comprehensive protection could be designed and tailored (La Playa Limited).

The US insurer Sadler & Co. claims on its website that *'[t]here will be four stages of nanotechnology development and each stage will represent unique challenges for the insurance industry to grasp and understand.'* (Sadler & Co.) The firm recons that we are currently in



"stage one', [which] is characterized by the development of small things that are relatively easy to create followed by finding a purpose for these items.' (Sadler & Co.)

### **Nanotechnology-specific risk-assessment, -management and -monitoring tools**

A number of nanotechnology-specific tools were developed, promising to support companies in their efforts to assess and manage the risks of nanotechnology, and to keep them updated with monitoring services; one of the first was the so-called CENARIOS® tool, offered by the Innovation Society in St. Gallen in collaboration with the TÜV SÜD Industry Service (Munich) since 2008 (TÜV SÜD, 2008).<sup>2</sup>

A number of companies adopted the tool and contributed to the risk assessment and risk evaluation knowledge collated by its developers. During presentations at nanotechnology conferences and trade fairs, the companies confirmed that the tool had helped them to analyse and better understand and thus manage the risks posed by the use and development of nanotechnologies at their plant; when asked by how much the adoption and contribution of the CENARIOS® tool reduced the cost of their insurance policy, however, one of the presenting companies had to admit that the insurance industry seemed to care little about the companies' adherence to the tool (or, at least too little to measure in monetary terms).

### **... and the ultimate opportunism: nanotechnology-specific litigations**

Both nanotechnology-specific exclusions and policies represent foreseeable reactions of the insurance industry in response to the uncertainties and 'unknown unknowns' that were the trademark of all things nanotechnology for a long time. It is remarkable, however, that both responses were adopted by insurers in tort law systems only, namely the USA, while the European market saw no such drastic reaction by the (re-)insurance industry to the continuing advancement of nanotechnology into an increasing number of processes and products. But maybe these responses by the insurance industry must be viewed in light of the ultimate extreme opportunism that the tort law system seems to attract: the tailor-made offer of no-win-no-fee tort actions against anything and everything, and – in this case – against nanotechnology: Figure 4 shows an advert for a typical offer for the exploitation of litigation claims regarding damages caused by nanotechnology.

**LawyersandSettlements.com**  
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Home Page >> Possible Cases >> Asbestos-like Nanotubes

### Asbestos-like Nanotubes Pose Serious Health Risks

A major study has revealed some forms of carbon nanotubes are likely to pose health risks similar to asbestos. If inhaled in sufficient quantities, this stronger than steel, lighter than air technology can penetrate lungs and cause significant damage. The technology, being developed for use in new drugs, energy-efficient batteries and futuristic electronics, is made up of long, thin multi-walled carbon nanotubes that look like asbestos fibers, and act like asbestos fibers. It is likely that asbestos is the worst occupational health disaster in U.S. history and carbon nanotube technology could be right on its heels.

MAY-22-08: [NANOPROJECT: CARBON NANOTUBES THAT LOOK LIKE ASBESTOS, BEHAVE LIKE ASBESTOS]

#### Carbon Nanotube Legal Help

If you or a loved one has suffered damages from Carbon Nanotube technology, please click the link below to send your complaint to a lawyer to evaluate your claim at no cost or obligation.

[Please click here for a free evaluation of your case](#)

What are you looking for?  
  
Search

Search 10,000 recent cases and settlements

- Home
- Lawyers wanting to advertise for Asbestos-like Nanotubes Pose Serious Health Risks cases sign up here.

**Lawsuits:**

- In the News

**Services:**

- Free Newsletters
- Email this Page to a Friend

### Asbestos-like Nanotubes Pose Serious Health Risks

Please submit your free case evaluation to a lawyer listed on LawyersandSettlements.com.

- \* Defendant: (who are you accusing?)
- \* Describe your complaint in one short sentence:
- \* Details of complaint: (briefly describe the damages you have suffered)

**Figure 4: Excerpt of a website advert offering litigation support for sufferers of 'asbestos-like nanotubes' damage.**

<sup>2</sup> The CENARIOS® risk management and monitoring system:  
<https://innovationsgesellschaft.ch/en/competences/risk-management/cenarios/> (accessed: 4<sup>th</sup> June 2020)

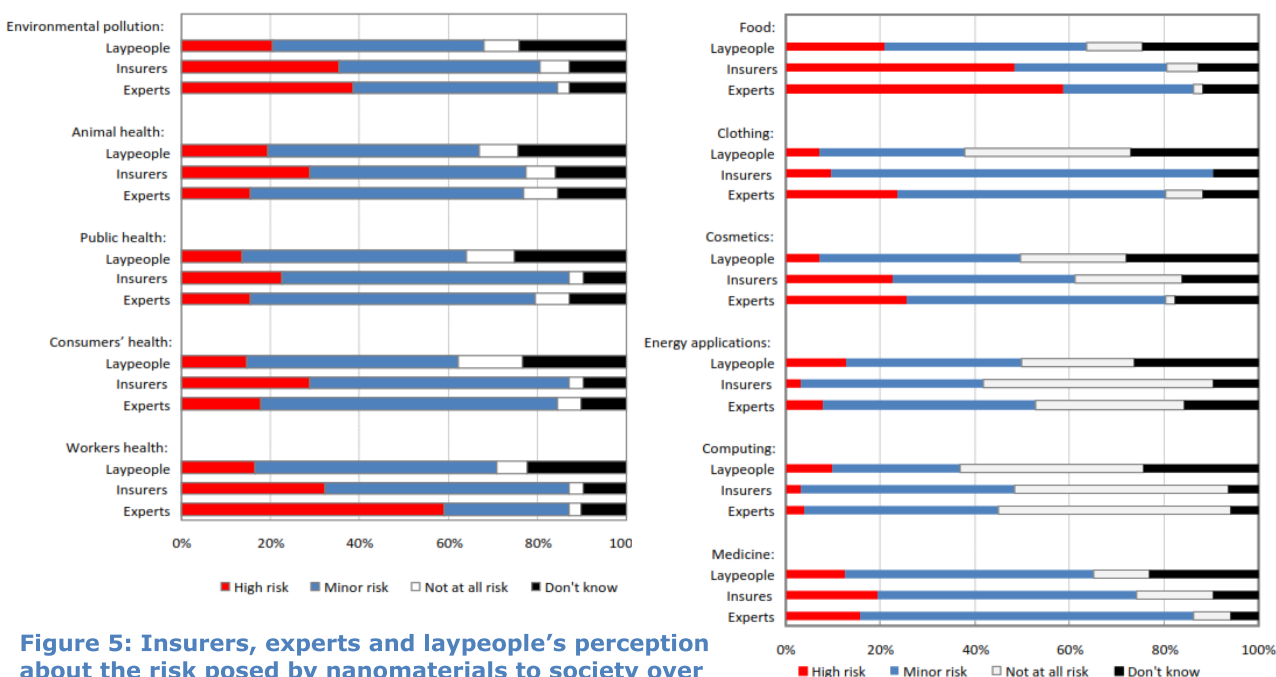
During the interview in October 2019, the Allianz Risk Engineer confirmed that the legal representation of insurance claims invoked very high service fees, with defence costs of insurance that were often higher than those of litigations. This concept is true for all insurance and is no nano-specific.

### 3.3.5 Evolution of nanotechnology's perception by the insurance industry

Since the flurry of the (re-)insurance industry's interest in and engagement with nanotechnology in the early 2000s, the lively discussion whether or not nanotechnology was insurable has certainly died down; moreover, a steady stream of nanotechnology-based processes and products has been implemented and commercialised by a range of industry sectors. All of this was done under the coverage of existing insurance policies.

Nevertheless, every now and again, a publication surfaced that aimed to alert the nanotechnology expert community and the public alike to the uncertainties surrounding nanotechnology and the insurance policies pertaining to it:

- In 2012, a Chemical Watch 'Global Business Briefing' looked at the liability issues concerning nanotechnology: the article focussed on the EU's product liability directive (European Union, 1985) and advised its readers *'to assess their exposure to possible claims or risks associated with the use of innovative products, such as those applying nanotechnologies.'* Insurers are told to *'assess current policies with their insurers regarding the underlying risks, and to review their own coverage under existing reinsurance agreements.'* (Chemical Watch, 2012)
- Another 2012 report by Gen Re, a reinsurance company, called for a collaboration in processing and analysis between several insurers and reinsurers. The report concluded in noting that the insurance industry's goal *'should support highly profitable nanotechnologies from an underwriting perspective, but without losing sight of the considerable risk potential. This can only be achieved through risk identification, risk monitoring and risk analysis. Simply waiting until risk materialises could have significant consequences for the insurance industry.'* (Wieczorek, 2012)
- In 2014, a combination of survey and interviews was carried out, in order to analyse insurers' perception of risks associated with nanotechnology and nanomaterials; the authors of the study find *'that insurers worry less about some nanotechnology risks than scientists.'* (Baublyte, et al., 2014) Figure 5 exhibits the study's results obtained by questioning 173 people (i.e. 39 nanotechnology experts, 31 insurers, and 103 laypeople).



**Figure 5: Insurers, experts and laypeople's perception about the risk posed by nanomaterials to society over the next 15 years (source: (Baublyte, et al., 2014))**

The report concluded that *'[t]he vast majority of the insurers surveyed said that they considered the benefits of nanotechnology to outweigh the risks. However, this optimistic view is in part due to the fact that there have been no reported major adverse events involving nanotechnology and/or nanomaterials to date. The insurance industry has a tendency to base their underwriting decisions on past experiences (i.e. claims history) rather than hypothetical future scenarios. The perceptions of insurers could shift towards a much more cautious approach in response to new information or due to a loss of a larger scale caused by nanomaterials production and/or use. (Baublyte, et al., 2014)*

- In 2017, a commentary in the high-impact journal Nature Nanotechnology noted that *'[n]anotechnology 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.'* (Murphy, et al., 2017) It goes on to imagine that an adverse event, whose origins were ascribed to nanotechnology, would cause the insurance industry to *'[exclude] nanotechnology-related activity from general liability policies [so that] bespoke insurance coverage would become necessary for operators in the field.'*

The report summarised that *'governments and regional organizations 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.'* The authors recommend that *'[s]cientists 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.'* (Murphy, et al., 2017)

The list of publication above represents a short selection of those publications that re-iterated the problems that nanotechnology could pose for the insurance industry, and that had originally been raised by the (re-)insurance industry itself, when it engaged with nanotechnology in the early 2000s. It is interesting that very few publications are authored by the insurance industry itself.

So, what does the (re-)insurance industry think about nanotechnology, and why is not running down the door of those collaborative projects that aim to provide them with tailor-made information regarding the risks of nanotechnology, or even the insurability of nanotechnology, as suggested by the NMBP-13 projects.

### 3.3.6 What (re-)Insurers think - the Case of the Allianz Group

The Allianz Group concluded its 2005 report with the following statement:

*[...] it seems neither feasible nor appropriate to start a debate about a general exclusion of nanotechnologies from the insurance coverage today.*

(Allianz Group, et al., 2005)

The insurer seems to have subsequently lived by this initial verdict, as well as its pledge to *'put its feelers out' on the subject'*, and to adopt a *'balancing act of risk-taking by limiting transaction costs, improving the evidence base and coping with a degree of uncertainty.'* (see Section 3.3.3 above).

In 2012, a presentation entitled *'Role of insurance for Innovative Technologies: Nanotechnology'* described the insurer's engagement with and ongoing analyses of nanotechnology; the presentation summarised many of the events and activities described above (Bruch, 2012). The presenter highlighted that nanotechnology represented a *'growth sector for commercial and industrial insurance cover'*; this "business opportunity" should have been seen (in 2012) as a potential industry segment, which required an increasing demand for risk mitigation solutions (not only insurance solutions), but without a specific need for nano-related insurance solutions.

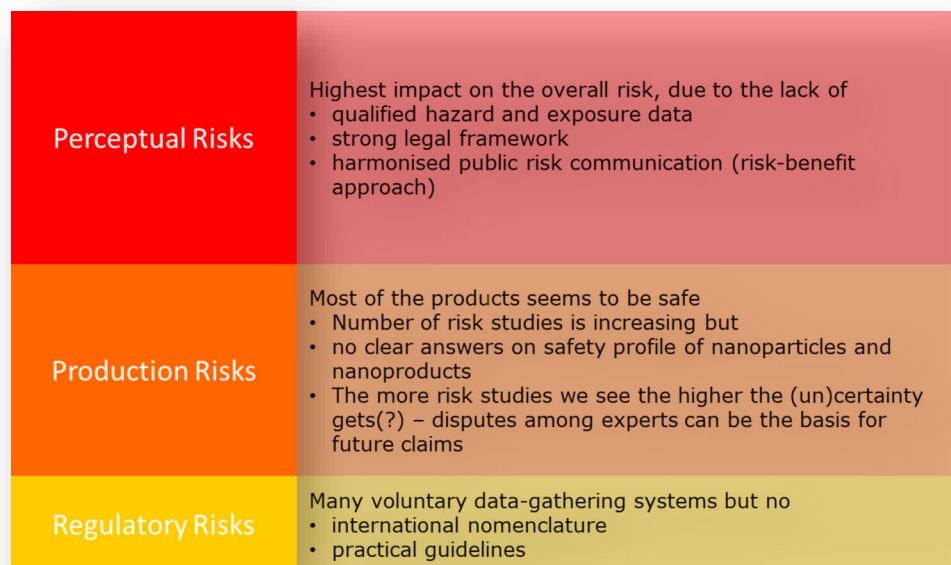
He also outlined the potential risks that nanotechnology posed to the insurance industry with much detail:



*Why is Nanotechnology an Emerging Risk for insurers:*

- *Existing insurance covers include risks of nanotechnology.*
- *The knowledge is incomplete in terms of emission sources and quantities, toxicology, ecotoxicology and environmental behaviour.*
- *Reliable standardised methods of measurement and guidelines for testing are mostly missing.*
- *Involvement of high number of companies from different industries incl. subsequent processing companies.*
- *Multiple lines of business and multiple classes of insured could see claims*
- *Potential loss scenario resemble[s] major product liability cases from the past.*
- *Regulatory uncertainties*
- *Unclear definition and terminology*
- *Ambiguity in risk perception - significant NGO activity and low consumer knowledge*
- *No loss history available*
- *Imbalance and lack of information*
- *Identification, monitoring and controlling of those few particles and applications which may pose a health or environmental risk is difficult.*

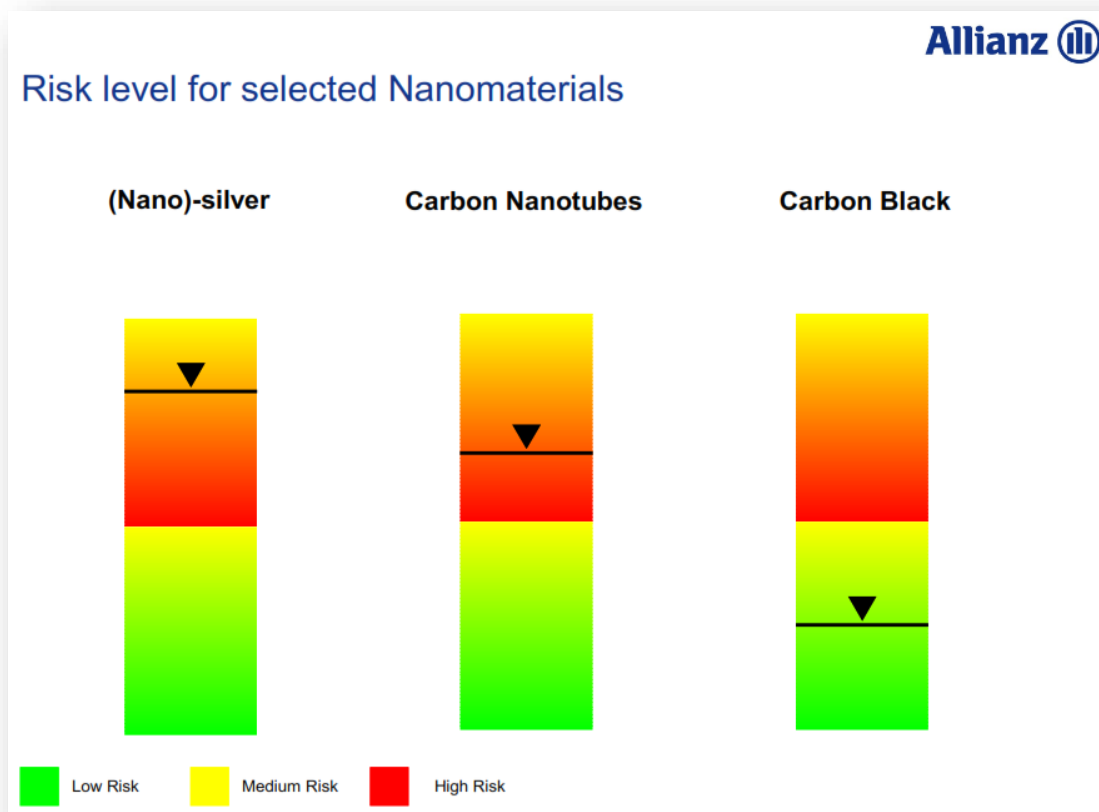
Figure 6 illustrates the nanotechnology risk landscape and its separate risk elements (and proportions) from the perspective of the Allianz risk engineer.



**Figure 6: Illustration of the nanotechnology risk landscape and its separate risk elements (and proportions) from the perspective of a Risk Engineer (source: (Bruch, 2012))**

The Allianz Group aimed to stimulate the discussion on nanotechnology-specific insurance-requirements by outlining a risk-assessment and -evaluation methodology, which used the weighting proportionality outlined in Figure 6; the methodology was used to determine the 'risk level' of three different nanomaterials (i.e. (a) (nano-)silver, (b) carbon nanotubes, and (c) carbon black, based on the knowledge and information available at the time). It needs to be noted, however, that this Allianz Group "risk scheme" never resulted in a nanomaterial dedicated risk assessment approach.

Figure 7 shows the resulting risk levels for the three nanomaterials:



**Figure 7: Illustration of risk levels for three selected nanomaterials, determined using the Allianz Group's risk assessment scheme. (source: (Bruch, 2012))**

The high risk level of (nano-)silver compared to the relatively lower risk level of carbon nanotubes may surprise some risk assessment experts; it needs to be noted, however, that the Allianz Group's assessment is applied *a posteriori* regulation: in the case of (nano-)silver, the insurer finds that '*[r]egulation based on environmental risks [is] to be expected*' and subsequently assigns a 'high regulatory risk', while in the case of carbon nanotubes, it notes that the '*[regulatory] framework for CNTs will probably change due to material specifics*', assigning a 'medium regulatory risk' to the fibrous material.

The 2012 Allianz Group presentation even analysed the case of *Magic Nano*, a bathroom sealant spray that had caused respiratory problems and hospitalisations in nearly 100 users, who had inhaled the aerosol soon after the product had been launched in a new aluminium spray can in 2006. Figure 8 shows the insurer's summary and evaluation of the *Magic Nano* case.

The insurance industry regarded the reputational risk of the *Magic Nano* incident as one of its major (cost) factors; the Allianz Group consequently called for better 'crisis communication' as part of a list of recommendations drawn from the incident (cf. Figure 8).

### Magic Nano - First Product liability claim with Nano?

**Product**

- Aerosol sealing spray for making glass and ceramic surfaces water- and dirt-repellant

**Loss history**

- 100 customers reported respiratory complaints
- Media: "First health-related product recall of an alleged nanotechnology consumer product"
- Insured product liability event (loss amount < 1 Mio EUR, secondary claims via social insurance agencies)

**Damage & loss analysis results**

- No nano-sized ingredients (silicon dioxide)
- Potential cause of loss: Inhalation of very fine airborne droplets
- Lack of evidence base




### Magic Nano - Lessons learned

**Reputational risk**

- First impressions matter
- Incident was a wake-up call for the whole nano community
- Negative blast for a hitherto positive image of business

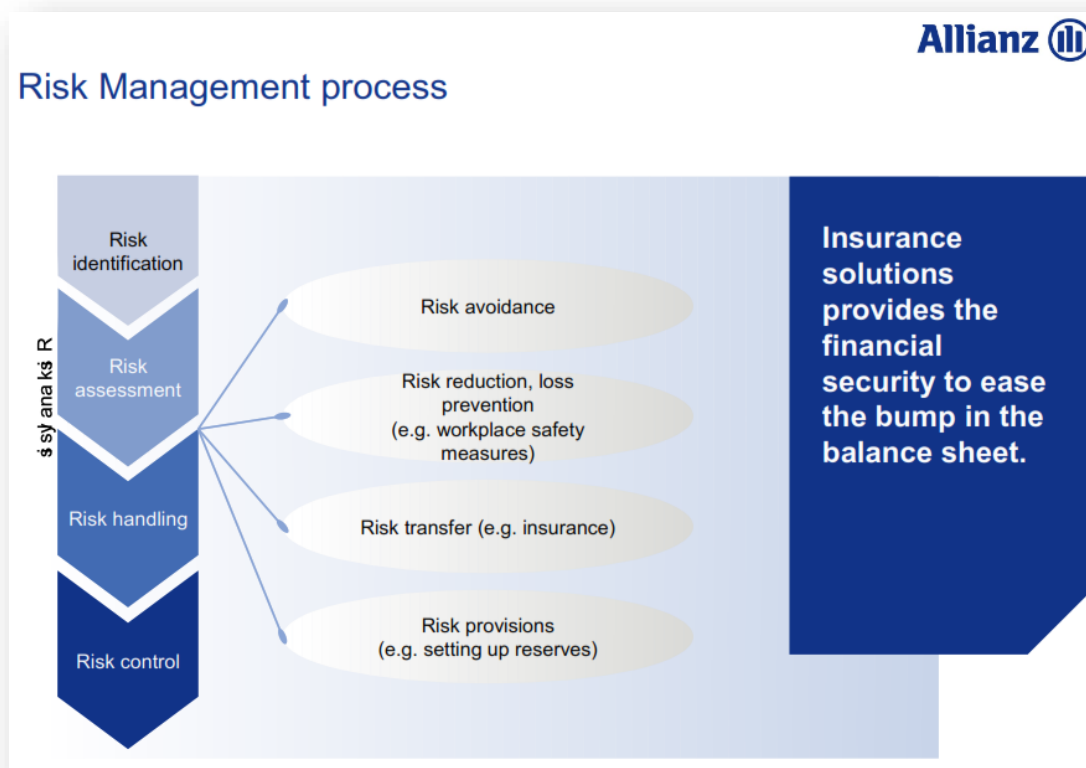
**Recommendations**

- Development of standards for terminology and labeling
- More transparency on use of nanomaterials and safety issues
- Appropriate research activities into human health and environmental impacts
- Risk Management:
  - Reputational damage exposure
  - Crisis communication



**Figure 9: Excerpt from the presentation by Michael Bruch, Risk Engineer at Allianz Group. (source: (Bruch, 2012))**

The 2012 Allianz Group presentation concluded with an illustration of the standard risk management process applied by the insurer (see Figure 9), thus demonstrating how existing measures had enabled the insurer to provide commercial and industrial insurance covers to nanotechnology without exclusions or nanotechnology-specific policies.



**Figure 8: Illustration of a general (not nano-specific) risk management process, illustrating where insurance solutions can come into play. (source: (Bruch, 2012))**

### 3.3.7 The Insurance Industry's 2019 View of Nanotechnology

For nine months, the Gov4Nano WP3 team tried to drum up interest for its plans to first analyse the (re-)insurance industry's knowledge of nanotechnology and subsequently develop and deliver tailored information to the industry; nobody in the industry seems very interested, though.

In an interview held in October 2019, a Risk Engineer at Allianz Group, noted that the insurance industry had not lost interest in nanotechnology, but the understanding was that the 'nano'-label was no longer needed.

*There are still open questions [surrounding nanotechnology], but that applies to many emerging risks from new technologies.*

(Risk Engineer at Allianz Group (2019))

Although the current risk profile of nanomaterials didn't require immediate underwriter actions, the unknown impacts of nanoparticles on human health and extent of its exposures still required continuous monitoring of the risk landscape.

The engineer explained that the insurance industry continued to monitor the technology as an emerging risk. One of its tasks was the assessment of the risks spanning across the life cycle of nanomaterials; this was increasingly done together with external partners (e.g. model providers, such as Praedicat who used advanced machine learning technology to process large volumes of data from peer-reviewed science publications and profiled the likelihood of products or substances linked to the litigation risks over their lifecycle) (Allianz Global Corporate & Speciality, 2017).

He explained that risk assessment of a company's liability exposure was based on the analysis of the inherent risk (e.g. high inherent environmental liability risk of the oil sector) and the maturity level of the company to handle those risks (= risk management performance).

*This situation [of significant risk] has never occurred in the broad field of nanotechnology, which means that [...] very few or non-nanospecific cases of claims have occurred. This also explains why the insurance industry classifies nanotechnology as an emerging risk but "merely" under monitoring based on the current state of knowledge.*

(Risk Engineer at Allianz Group (2019))

By way of summarising the (re-)insurance industry's relationship with nanotechnology, the engineer outlined that *'the insurance industry is not insuring technologies but insurable risks linked to [products or processes] (e.g. industry processes, property cover against explosions, fire (=first party risks), product, employer's or environmental liability risks (third party risks) or pure financial risks). If a risk turns out to be significant [...], it might make sense to separate this risk from traditional insurance contracts (e.g. by exclusions) and to offer affirmative/stand-alone covers [...]. This situation has never occurred in the broad field of nanotechnology, which means that [...] very few or non-nanospecific cases of claims have occurred. This also explains why the insurance industry classifies nanotechnology as an emerging risk but "merely" under monitoring based on the current state of knowledge.'*

### 3.4 Evaluation and conclusions

The Gov4Nano WP3 team had to abandon its initial plans to conduct a detailed analysis of the (re-)insurance industry's knowledge of nanotechnology and to subsequently develop an information service for the industry as part of the NRG's service offering. Nevertheless, this deviation from the initial work plan represents no defeat, but a positive result for the nanotechnology community: all evidence appears to indicate that the insurance industry has been able to cover commercial and industrial advances in nanotechnology as part of its regular approach to new and emerging technologies; there has been no nanotechnology-specific loss.

The industry's ongoing monitoring of the nanotechnology, as well as its classification of the latter as a 'medium risk' with an associated 'first significant impact expected within 1 – 5 years' (CRO Forum, 2019), however, indicates that the technologies' 'phantom risks' or reputational

risks remain high. The Gov4Nano WP3 team thus decided to re-focus its efforts in support of the development of crisis-management and -communication procedures and recommendations; this new objective could form both an output and a permanent service by the NRGc, and thus support the (re-)insurance industry and the versatile nanotechnology industries alike.

## 4 Deviations from the work plan

Despite repeated efforts, it became clear within the first nine months of the Gov4Nano project that the (re-)insurance industry was not interested in engaging with the Gov4Nano project, in order to find out more about the risk assessment of nanotechnology-based products and processes (see section 3.2 above). It was thus decided to change the focus of Tasks 3.2 and 3.3: the Deliverables *D3.3 (Report on the (re-)insurance industry's knowledge about and provisions towards nanotechnology and its applications and on the industry's information needs (M17))* and *D3.4 (Report on information needs of the (re-)insurance industry (M36))* would be merged into a single report, which would focus on explaining the history and development of the (re-)insurance industry's engagement with nanotechnology, and explain its established (and now largely routine) treatment of nanotechnology-based products and processes. No training of the (re-)insurance industries would take place in Task 3.3; instead, Task 3.4 would ensure that all results from T3.2 would be taken into account for the NRGc design and its (re-)insurance pillar.

## 5 Performance of the partners

Gov4Nano Partners contributing to WP3 tried to find representatives of the insurance industry that were interested and available to work with the Gov4Nano project regarding its plans to (a) analyse the insurance industry's knowledge about nanotechnology and its practices applied to ensure nanotechnology products and processes (Task 3.2), and (b) provide tailor-made information and training to the insurance industry (Task 3.3, Sub-Task 3.3.2). TEMAS, in particular, made contact with an association of insurers and re-insurers and tried to arrange further contacts for the conduct of Task 3.2 through the association.

All WP3 partners contributed to the review and improvement of this deliverable. – Thank you.

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