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Insurance Risk Prevention: Selected Perspectives and Aspects

The text provides a multifaceted analysis of prevention and mitigation in the insurance sector. The observations presented are intended not only to describe the economic and legal situation, but also to identify future directions for development and the significance of the institutions described in the context of new technologies and innovative fields of activity. Attention is drawn not only to current legislation, but also to proposed solutions, such as the PEICL at EU level.

Keywords: risk prevention, loss reduction, sustainable development, SDGs, good faith, risk management, insurance contract, private law, PEICL

Introduction – general assumptions

The word ‘prevention’ semantically derives from Latin, where the verb *praevertere* means ‘to prevent’. The concept of prevention has had a limited, but nevertheless significant, impact on Polish civil tort law, where it ultimately found its expression in Article 439 of the Polish Civil Code¹ with

1. Act of 23 April 1964 – Civil Code (consolidated text: Journal of Laws of 2025, item 1071, as amended).

regard to tort liability. For private insurance² in general, preventing and counteracting the occurrence of an insured event, and above all, damage, is of fundamental importance, as it is in civil law *per toto*. It has been rightly noted in Polish literature that ‘the task of prevention is to prevent a latent danger (potential risk) from turning into actual damage. However, if prevention fails to eliminate the risk and damage occurs, it will be covered by insurance’³ It is worth noting that prevention has not become the exclusive domain of civil tort law but has also found its place in public insurance law. This illustrates the interdependence of the preventive and compensatory functions in private insurance. However, this is not only characteristic of private law, but is a key issue for economics, insurance finance, and the sociological aspects of insurance, including organisational theory.

At the same time, it should be recalled that preventive methods became prominent at a stage in the development of insurance (self-)awareness, when people learned to counteract threats both from the outside world and those resulting from the activities of the person threatened by these actions⁴. For this reason, in addition to the repressive and compensatory functions, the basic functions of compensation law also included the preventive function, combined (and rightly so) with the educational function⁵. Against this background, it has been doctrinally accepted to distinguish three forms of insurance protection: technical (relating to the design and application of technical preventive measures), economic (implemented through financial mechanisms that encourage preventive measures and finance them via local government, public agencies or insurance companies) and legal prevention (also known as normative prevention, which formulates the legal framework for the implementation of technical prevention and the efficient adoption of economic prevention measures)⁷. At the same time, insurance prevention is not only a legal issue and certainly not a matter for lawyers alone, but also a fundamental issue for many other areas of social and economic life.⁸

Although insurance has been known for centuries as a tool for transferring risk in order to compensate for the consequences of its materialisation, its potential does not end there. One of the long-known but often overlooked functions of insurance is risk prevention. With this in mind, we must remember that insurance is traditionally a form of risk management⁹, and today’s insurers are the risk managers of the modern world. The experience gained by insurers has always predestined them to go beyond purely compensatory aspects.

2. For the justification for using the adjective ‘private’ instead of ‘economic’, see: Fuchs D., *Interes ubezpieczeniowy w europejskim projekcie PEICL w świetle kodeksowej regulacji umowy ubezpieczenia*, w: Księga Pamiątkowa Profesora Andrzeja Kidyby, Warsaw 2020, p. 33 et seq.
3. Warkało W., Marek W., Mogiński W., “Prawo ubezpieczeniowe”, Warsaw 1983, p. 62.
4. Cf. Łazowski, *Wstęp do nauki o ubezpieczeniach*, Sopot 1998, p. 12; for general comments, see Warkało W., *Odpowiedzialność odszkodowawcza. Funkcje, rodzaje, granice*, pp. 32–33 and pp. 52–53.
5. Among many others: Dybowski T., *Naprawienie szkody*, in: Z. Radwański (ed.), *System Prawa Cywilnego*, vol. III, part 1: *Prawo zobowiązań. Część ogólna*, Ossolineum 1981, pp. 211–212.
6. Among many others: Dybowski T., *Naprawienie szkody*, in: Z. Radwański (ed.), *System Prawa Cywilnego*, vol. III, part 1: *Prawo zobowiązań. Część ogólna*, Ossolineum 1981, pp. 211–212.
7. Hadyniak B., *Ubezpieczenie jako urządzenie gospodarcze*, in: Monkiewicz J. (ed.) *Podstawy ubezpieczeń*, vol. I: *Mechanizmy i funkcje*, Warsaw 2000, pp. 66–67; also: Warkało W., Marek W., Mogiński W., *Prawo...*, pp. 76–79; Banasiński A., *Ubezpieczenia gospodarcze*, Warsaw 1996, p. 200 et seq.
8. See in more detail: Fuchs D., *Obowiązki (powinności) prewencyjne w świetle prawa prywatnego i publicznego scilicet spei permultum sed rei paulum*, *Prawo Asekuracyjne* 2/2020 (103), pp. 51–71.
9. Vaughan E.J., *Fundamentals of Risk and Insurance*, J. Wiley & Sons Inc., New York; Williams et al. 1997. *Risk Management and Insurance*. McGraw-Hill Professional.

This issue is particularly important when viewed from the perspective of the development of advanced insurance markets, such as the English insurance market, exemplified by Lloyd's of London. Experience from such markets can inform domestic practice, both with regard to the social perception of prevention and the design of a comprehensive legal framework.

Therefore, one of the auxiliary, yet important, functions of insurance is risk prevention, considered the most rational method of loss control. In insurance methodology, it is often argued that compensation and prevention constitute two core, and in principle equal, functions of insurance. It is also argued that conducting insurance business without prevention would be unprofitable. Thanks to prevention, the insurer's claims settlement process can become more sustainable.¹⁰ The preventive function therefore stems from the social role of insurance, and although its competitive value in the market should also be obvious, it is sometimes questioned.¹¹

Emerging technologies offer insurance companies, policyholders and governments various opportunities to control losses and to implement more efficient risk management practices.¹² The issue of risk prevention and mitigation is increasingly being raised by all of the above stakeholders, indicating that insurance and risk prevention are complementary. Just as insurance protects a customer's business from the effects of current and future risks, loss prevention mitigates those risks and the losses they may cause. This is also reflected in the demand for insurance products that not only pay compensation but also provide loss mitigation services.¹³ The context of this position paper is not only rooted in theoretical considerations about insurance ideals, but also responds to dynamic changes in technological, social and environmental realities. Three fundamental factors prompted this study: (1) dynamic changes in the risk landscape; (2) emerging technologies that facilitate risk prevention; and (3) a perceived regulatory gap in meeting societal needs and technological potential¹⁴.

Another important motivating factor for the study is the link between prevention and sustainable development goals as well as Environmental, Social and Governance (ESG) strategies, i.e. organising businesses to take account of financial, environmental (including climate and biodiversity),

10. Sangowski T., *Economic Insurance*, Warsaw 2001, pp. 100–101.

11. Warner K. et al., *Adaptation to Climate Change. Linking Disaster Risk Reduction and Insurance*, United Nations International Strategy Reduction Secretariat (UNISDR); However, the opposite suggestion is expressed by B. Lurger, *The "Social" Side of Contract Law and the New Principle of Regard and Fairness*, in: Harthkamp A., Hessenlink M. (eds.) *Towards European Civil Code*, 2004, Kluwer; Bednarczyk T., in: *Insurance*, (ed.) Ronka-Chmielowiec W., CH Beck 2016, p. 51; Mogilski W., *Prevention – the underestimated function of insurance*, in: *Good law for insurance, Jubilee Book of Professor Eugeniusz Kowalewski*, (eds.) Bagińska E., Mogilski W., Włachowska M., Toruń 2019.

12. Gallagher Bassett. [2018, April 26], *Four emerging technologies opening up new loss prevention opportunities for insurers*, <https://www.gallagherbassett.co.nz/four-emerging-technologies-opening-new-loss-prevention-opportunities-insurers/>

13. Balasubramanian R., Libarikian A., McElhane D., *Insurance 2030 – The impact of AI on the future of insurance*, McKinsey & Company, 12 March 2021, <https://www.mckinsey.com/industries/financial-services/our-insights/insurance-2030-the-impact-of-ai-on-the-future-of-insurance> [accessed: 14.05.2026]; Flückiger I., Carbone M., *From Risk Transfer to Risk Prevention How the Internet of Things is reshaping business models in insurance 2021*, The Geneva Association, May 2021, https://www.genevaassociation.org/sites/default/files/iot_insurance_research_report.pdf [access: 14.05.2026].

14. The article reflects the preliminary objectives and assumptions of a research project recently launched by the European Law Institute, entitled „Prevention in Insurance”.

social and human factors, ensuring resilience and long-term value creation.¹⁵ It should also be noted that all Sustainable Development Goals (SDGs) ‘indirectly focus on reducing or controlling the risks caused by unsustainable social, economic or environmental trends and their interactions’¹⁶. Implementing SDGs involves risk management, such as uncertainty management, risk prevention, risk-benefit assessment, risk communication and risk compensation. The effective implementation of sustainable development goals requires paying particular attention to risk and a more multifaceted and rigorous analysis of risk management, starting with the identification of the most significant types of risk. Sustainable development goals can actually help achieve risk management objectives by improving risk identification, refining strategies, developing indicators, targeting resources, etc. Researchers studying sustainable development goals in the context of risk management pose, in effect, questions such as whether sustainable development itself can be understood as a comprehensive form of risk reduction, or what could be more sustainable than mitigating, avoiding and transferring risks while protecting the environment?¹⁷

Insurance can undeniably play a role in achieving sustainable development goals (see the 2015 UN Framework for Disaster Risk Reduction). Insurers have also begun to recognise their role as risk managers [beyond their traditional role as risk carriers]. The contribution of the insurance industry to the transition towards low-carbon, resource-efficient, inclusive and disaster-resilient economies implies a shift in insurers’ approach to risk-taking, with a stronger, more structured and institutionalised emphasis on loss prevention and loss mitigation. For a number of years, many insurers have operated dedicated loss-prevention programmes designed to reduce the probability of insured events.¹⁸

Insurance stakeholders, both insurers and intermediaries, recognise the direct link between insurance and ESG. This includes a comprehensive approach to risk management, including risk prevention and mitigation. It covers all three ESG factors. In environmental terms, this relates in particular to the drivers and manifestations of climate change and underscores the urgent need for action and behavioural change. There is no doubt that the insurance industry has the practical potential to support and encourage positive behavioural change; insurance prevention also has an important role to play in addressing emerging risks. Finally, with regard to the social responsibility

15. FERMA, *People, Planet and Performance; Sustainable Development. The contribution of corporate risk management to sustainable development*, Brussels 2021, https://www.ferma.eu/wp-content/uploads/2021/03/Ferma-sustainability_2021_final.pdf [access: 14.05.2026].
16. Partnership for European Environmental Research, “Sustainable development needs comprehensive risk awareness”, Peer Policy Brief 2019, https://www.peer.eu/files/user_upload/projects/PEER-TRISD_PolicyBrief_2019_update_may2020.pdf [access 14.05.2026].
17. N. de Marcellis-Warin *et al.*, “Sustainable Development Goals and Risks: The Yin and the Yang of the 2030 Agenda,” *Risk Analysis* 42, no. 11 (2022): 2566–67.
18. Holliday, S., I. Remizova, and F. Stewart. 2021. *Developing Insurance Markets: The Insurance Sector’s Contribution to the Sustainable Development Goals*. Washington, DC: World Bank Group; United Nations Environment Programme Finance Initiative (UNEP FI). “Insurance – Principles for Sustainable Insurance (PSI).” Accessed May 10, 2026. <https://www.unepfi.org/insurance/> [access: 14.05.2026]; United Nations Environment Programme (UNEP). 2015. *Insurance 2030: Harnessing Insurance for Sustainable Development*. Geneva: UNEP Inquiry into the Design of a Sustainable Financial System; Gritz, L.A., W. Doerr, R. Bill, H. Ali, S. Nong, and L. Krasner. 2009. *The Influence of Risk Factors on Sustainable Development*. Technical Report P09104a. Johnston, RI: FM Global; If P&C Insurance. 2019. “Sustainability in Claims and Loss Prevention.” *Risk Consulting Magazine* 2019/1. Accessed May 10, 2026. <https://www.if-insurance.com/large-enterprises/insight/risk-consulting-magazine/risk-consulting-2019-1/sustainability-in-claims-and-loss-prevention> [access: 14.05.2026].

of insurers, it is emphasised that they must become 'a sustainable entity in risk assessment, prevention [loss control] and a role model for the community'.¹⁹

For this reason, preventive approaches to data handling and the ethical implications of data-driven prevention are also crucial elements of the social dimension of modern insurance and merit particular attention. Risk prevention appears to be one of the fundamental risk management strategies, which distinguishes between risk avoidance, loss prevention and loss reduction. While risk avoidance is self-explanatory and refers to the avoidance of certain activities or actions where the expected loss exceeds the expected gain, loss prevention and loss reduction require a more nuanced approach. According to some opinions, although both strategies aim to reduce the risk of loss, they operate in different ways. **Loss prevention** aims to reduce risk by reducing the frequency or chance of an undesirable event occurring. Loss prevention tactics are often considered proactive and seek to prevent risk before it can cause injury or damage, examples being machine guards on a drilling press to prevent workers' hands from being caught. **Loss mitigation**, on the other hand, focuses on reducing the severity of an accident or loss. Loss mitigation tactics are not designed to prevent adverse events, but rather to limit their impact once they occur, for example, installing sprinkler systems in a warehouse or having clear evacuation procedures for customers and employees. Loss reduction, (often referred to as loss control) similarly seeks to decrease the severity of events that do occur. This involves identifying sources of risk and is accompanied by voluntary or required actions that the insurer should take to reduce risk through safety and risk management information and services.

Undoubtedly, both of the above risk management strategies have the same objective, but the distinction between them is important from a legal point of view and in terms of how they are applied in the performance of an insurance contract. For the purposes of this paper, an attempt will be made to examine the potential for preventing and limiting damage in the face of new and rapidly developing technical capabilities available to insurers. From a legal point of view, however, broadly understood, prevention should be perceived as both (1) measures aimed at avoiding the materialisation of risk, referred to as 'cautionary measures', which should be taken before the occurrence of an insured event; and (2) measures aimed at preventing (avoiding or reducing) the consequences of an accident that has actually occurred, which can also be referred to as 'loss mitigation'. Based on the definition of risk, prevention can affect both elements, i.e. the probability and impact of an event. If we consider the ultimate goal of preventive measures, which is to reduce costs, as well as the inevitable nature of certain natural hazards such as earthquakes, volcanic eruptions and hurricanes, it seems that, from an economic and axiological point of view, all of the above measures can be functionally considered as risk prevention measures.²⁰

Against this background, the paper examines legal, technological and economic issues of risk prevention in insurance and considers the issue of preventive and mitigation measures from

19. The Global State of Sustainable Insurance Understanding and Integrating Environmental, Social and Governance Factors in Insurance Report of the Insurance Working Group of the United Nations Environment Programme Finance Initiative Based on the IWG's pioneering 2009 global study on ESG factors and insurance underwriting and product development; https://www.unepfi.org/fileadmin/documents/global-state-of-sustainable-insurance_01.pdf [access: 14.05.2026].
20. M. Eling, D. Nuessele, J. Staubli (2022), The impact of artificial intelligence along the insurance value chain and on the insurability of risks, *The Geneva Papers on Risk and Insurance – Issues and Practice* (2022) 47:205–241, <https://doi.org/10.1057/s41288-020-00201-7> [access: 14.05.2026]; World Bank Group, *How technology can make insurance more inclusive*, <https://openknowledge.worldbank.org/handle/10986/30059> [access: 14.05.2026].

different, but not necessarily contradictory, points of view. The authors argue that risk prevention is a critical element in the insurance market, but there is no doubt that we need public-private interaction for, among others, climate, agricultural, financial and cyber risks. The analysis therefore seeks to address questions such as: how can technology help us prevent risks and mitigate losses; what can and should the insurance industry and operators of new technologies do to make it happen; and finally: are new regulations truly needed or can we develop best practices? Lastly, we examine insurance prevention in terms of the Project on Insurance Contract Law prepared on behalf of the European Commission. The overarching aim of this paper is to present the issues of prevention and mitigation under different aspects of insurance theory and practice, including a comparative perspective, in order to highlight the shortcomings of the current situation. At the same time, the authors seek to stimulate a renewed debate on prevention and mitigation, taking into account the impact of new technologies, including AI, on these issues.

1. Prevention in insurance: an economic perspective

One important economic issue in risk management concerns a decision between two options: transferring risk via insurance contracts or reducing risk through preventive investments²¹. This trade-off has long been a topic in economic theory, but modern challenges – especially those caused by climate change and systemic environmental damage – have made traditional models more complex. Understanding how these options interact, when one is more likely to be chosen, and how new technologies are changing this relationship is crucial for both academic understanding and practical applications in insurance markets.

1.1. The economics of insurance and prevention: core trade-offs

Economic decision-making under uncertainty requires choosing between two risk management strategies: purchasing insurance by paying a premium or investing in prevention to lower the probability or impact of a loss²². From a normative standpoint, rational agents choose the option that minimises expected costs and maximises utility. However, the key issue is to consider prevention and insurance as complementary components of a joint solution rather than as mutually exclusive alternatives.

An insurance premium is the amount an insurer charges to cover the policyholder's risk exposure through risk transfer. The cost of prevention includes expenses aimed at reducing the occurrence or severity of adverse outcomes. Understanding how these costs relate to one another helps explain how prevention investments can lower premiums or broaden coverage, which is essential for risk management and policy development.

Prevention is recognised as a key part of risk management frameworks. However, the pricing and availability of insurance – and consequently the relative cost of risk transfer compared to risk reduction – are not determined solely by external factors. Instead, they depend on changing

21. Arrow, K.J., *Uncertainty and the Welfare Economics of Medical Care*. In: *The American Economic Review* 53 (1963), No. 5, pp. 941–973.

22. Ehrlich, I.; Becker, G.S., *Market Insurance, Self-Insurance, and Self-Protection*, In: *Journal of Political Economy* 80 (1972), No. 4, pp. 623–648.

conditions within insurance markets and broader economic systems. Specifically, two factors primarily influence the feasibility and cost structure of insurance solutions: accessibility and insurability.

1.2. Market constraints: accessibility and insurability

Accessibility refers to the ability of potential policyholders to obtain and maintain insurance coverage at current market prices²³. When insurance premiums surpass individuals' or organisations' financial means, coverage effectively becomes unavailable, regardless of its theoretical availability. These accessibility issues create *protection gaps*, where prospective policyholders need protection but cannot afford the coverage offered. Such gaps leave households and businesses with insufficient risk protection even when they actively seek insurance. The protection gap can also result from a lack of demand due to low awareness.

Insurability, defined as the ability of insurance markets to provide coverage for a specific risk category at financially feasible premium levels, serves as a second important constraint²⁴. When risks do not 'fit' the insurability criteria²⁵, policyholders face limited or no access to traditional insurance, prompting questions about alternative risk management methods and policy actions to fill coverage gaps.

Both accessibility and insurability are becoming critical issues due to the increasing gravity of climate and biodiversity (nature-related) risks. The increasing frequency and severity of climate-driven disasters – including flooding, wildfires, severe weather, and tropical storms – have placed significant strains on insurance market capacity in exposed regions²⁶. These challenges threaten insurance market stability and underscore the need for integrated prevention and risk-transfer strategies to manage increasing environmental risks effectively.

Environmental damage and ecosystem collapse create financial constraints that spread through various pathways: soil erosion that reduces agricultural productivity; loss of natural infrastructure that provides protective services (wetlands that help control floods, coastal vegetation that reduces storm surges); and species decline, impacting pollination and food security. These interconnected risks form complex loss dependencies that go beyond the limits of traditional insurance models, making it harder to insure sectors that rely on ecosystem services.

1.3. Cost structure of preventive investments

Preventive investments incur costs that extend beyond the horizon of current expenses – prevention economics separates these categories of costs²⁷.

Direct costs include tangible, easily measurable expenses required to carry out preventive measures, such as investments in protective infrastructure (seawalls, fire suppression systems,

23. Kunreuther, H.; Pauly, M., *Insurance Decision-Making and Market Behavior*. In: *Foundations and Trends in Microeconomics* 1 (2007), 1 (2), pp. 63–127.

24. *Ibidem*.

25. Outreville, J.F., *Theory and Practice of Insurance*. Boston, MA: Springer US, 1998, pp. 138–139.

26. IPCC, *Climate Change 2022 – Impacts, Adaptation and Vulnerability*, Cambridge University Press, 2023, p. 66.

27. OECD, *Cost-Benefit Analysis and the Environment*, OECD Publishing, 2018; IAIS, *Global Insurance Market Report (GIMAR): Potential financial stability implications of natural catastrophe insurance protection gaps*, Basel, November 2025, Special Topic Edition.

safety equipment), the purchase and installation of monitoring technologies, and the implementation of formal training programmes. These costs are recognised immediately and are relatively simple to measure.

Indirect costs are expenses that are less obvious but economically significant. These include the opportunity costs of organisational time spent on preventive activities, such as temporary productivity drops during the implementation of safety measures, ongoing maintenance and compliance costs, and intangible factors, such as potential reputational damage and organisational disruption. The total amount of indirect costs often approaches or surpasses direct costs, yet they receive limited attention in simplified cost-benefit analyses.

The relative amount and structure of prevention costs determine whether prevention or insurance offers a greater advantage in specific risk situations. When both direct and indirect prevention costs remain low in relation to expected loss values and insurance premiums, investing in prevention is financially sensible. However, when prevention costs rise significantly – due to technological limits, organisational capacity constraints, or technical difficulties – insurance options become more attractive.

1.4. Informational and infrastructural requirements for prevention

Effective prevention strategies cannot depend solely on intuition or incomplete data. Achieving successful risk reduction requires a robust information infrastructure underpinned by systematic data collection and analysis²⁸.

Risk mapping converts complex, geographically and temporally distributed hazard data into easy-to-understand visual formats, such as flood risk maps, wildfire susceptibility assessments, seismic hazard zones, and cyber threat dashboards. These tools play vital roles in turning abstract risk concepts into spatial and temporal details, helping to prioritise where to focus preventive resources. Without such mapping systems, prevention efforts are limited by incomplete information about where risks are concentrated and which populations or assets are most exposed.

Determining whether specific preventive measures lead to the expected reduction in risk requires a systematic evaluation of outcomes, such as the effectiveness of:

1. implementing specific safety protocols to reduce injury rates;
2. installing building hardening strategies to lessen the severity of damage during severe weather events; and
3. deploying early warning systems for evacuation.

A thorough effectiveness assessment – based on comparative data analysis – distinguishes genuinely protective measures from interventions that only create the illusion of benefits or placebo effects.

Monitoring the adequacy of prevention measures and determining whether the benefits outweigh the costs requires an analysis of economic efficiency. Comparing prevention costs systematically with the value of avoided losses and transferred risk management expenses provides the information needed for sound resource allocation. This analysis must include both direct and indirect costs and consider the timing of costs and benefits.

28. Loayza, N.V., Otker-Robe I., *Risk and Opportunity – Managing Risk for Development*, <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/273251468336570194>; [access: 08.01.2026].

Risk categories with systemic aspects – especially those related to climate change, pandemics, or infrastructure failure – go beyond what private insurance markets can handle on their own. Tackling these risks requires collaborative efforts that combine government and private-sector efforts²⁹. Governments provide data infrastructure, regulatory frameworks, public goods (such as early warning systems and disaster response capabilities), and risk pooling through public insurance programmes. Private insurers contribute technical expertise, risk modelling, capital, and innovation in protective measures. Neither sector alone has sufficient resources or information to manage systemic risks.

1.5. Evolution of insurance business models and prevention integration

Recent developments in insurance markets indicate a significant shift in the relationship between insurers and prevention. Traditional insurance models focus on risk transfer: individuals or organisations buy policies that transfer specific risks to insurers, with premiums based on an actuarial assessment of the likelihood and severity of losses. Modern insurers are increasingly adopting a broader approach, integrating prevention services directly into their policy offerings, due to decreasing insurability³⁰. These methods use Internet of Things (IoT) sensor technology and real-time data analysis to detect emerging hazards before losses occur; provide early-warning alerts to policyholders; and offer prescriptive advice on protective actions³¹. These insurers can reduce expected losses more effectively through hazard prevention than by paying after the loss occurs, thereby making the risk more insurable.

Historically, insurance practices set premiums annually based on fixed risk classifications, with premiums remaining unchanged throughout coverage periods. Modern telematics technology and real-time data collection enable dynamic underwriting models that continuously adjust premium costs based on observed behaviour. Individuals who drive cautiously receive premium discounts, while those exhibiting risky driving habits face premium increases. This system encourages responsible behaviour, as people directly face financial consequences that align with their driving patterns.

However, dynamic underwriting creates a paradoxical incentive structure. If insurers constantly adjust premiums to reflect current risk levels, individuals have less motivation to make essential preventive investments that address the root causes of risk. Why invest heavily in accident prevention infrastructure if insurers will adjust prices based on current safety behaviour? This conflict between short-term incentive alignment and long-term structural prevention remains poorly addressed in modern dynamic underwriting models.

Despite significant advances in prevention capabilities and the increasing integration of prevention services into insurance business models, fundamental limitations on the scope of prevention

29. *Ibidem*.

30. Malinowska, K., *Risk prevention and insurance. Reaching or trespassing the insurance boundaries?*, *Wiadomości Ubezpieczeniowe* 2023/4, pp. 3–21.

31. van Dalen, B.; Ferris, A.; Cusick, K., *The rise of the exponential underwriter. Leveraging a convergence of data, technology, and human capital to transform underwriting in insurance*, <https://www.deloitte.com/us/en/insights/industry/financial-services/future-of-insurance-underwriting.html?id=us:2sm:3li:4di6794:5awa::MDDYY:&pkid=1007185> (access: 14.05.2026)

remain³². Specific risk categories cannot be eradicated: earthquakes result from tectonic processes beyond human control; pandemics arise from biological dynamics beyond human influence; catastrophic events involve low probability but extreme high severity. These residual risks – those that remain after implementing optimal prevention measures – require risk-transfer mechanisms that insurance alone cannot provide.

Prevention and insurance, accordingly, function as complementary mechanisms rather than substitutes. Prevention reduces the frequency and severity of expected losses, thereby improving overall risk profiles. Insurance transfers the remaining unavoidable risks, protecting against catastrophic outcomes and providing resilience in the face of unpreventable events. Comprehensive risk management requires the systematic integration of both mechanisms.

2. Risk prevention and insurance. Legal considerations regarding the impact of new technologies on insurance functions

2.1 The social dimension of new technologies and their preventive potential

Prevention is an area where new technologies seem to have enormous and relatively uncontroversial potential. This includes not only the identification of factors that increase the risk of damage, but also the ability to respond quickly when damage occurs in order to limit its effects.³³ It is argued that moving beyond risk transfer towards risk mitigation and prevention will be a critical factor for insurers and customers in a more risky world.³⁴

One of the main pillars of insurance is access to information and data.³⁵ Risk data is important at every stage of the insurance relationship, from risk assessment to claims settlement, and is also the basis for the financial stability of the insurance market *in a broad sense*. The way in which information and data available to insurers was collected, as well as the manner and timing of its processing, presented a completely different picture in the past. Today, we have access to various types of data from different sources: technologically advanced, including satellite data, general IT data and genetic data.³⁶ Rapidly developing science and technology allow us to obtain new types of data, with a wider scope, and enable us to process it extremely quickly and accurately. The actual impact of new technologies in the field of data collection and processing is largely related to aspects such as more precise risk assessment, more granular risk segmentation and

32. Ehrlich, I.; Becker, G.S., *Market Insurance ...*; Arnold-Dwyer, F., *Using Insurance for Natural Hazard Loss Prevention*, in: *Insurance*; Kysar D., Lim E. (eds), *The Oxford Handbook of Climate Change and Private Law* (Oxford University Press, forthcoming), Faculty of Laws University College London Law Research Paper No. 06/2025.

33. Boyer M., Mills E., Lecomte E., *From Risk to Opportunity: How Insurers Can Proactively and Profitably Manage Climate Change*, 2006 <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.174.1451&rep=rep1&type=pdf> [access: 25.05.2026].

34. ADB and OECD, *Using Technology and Innovation in Natural Disaster Risk Management and Financing*. 2020, Manila/Paris; CEOS. [2015], *Satellite Earth observations supporting natural disasters; Risk reduction*, European Space Agency – Earth Observation Graphic Office; KPMG [2020], *Frontiers in finance: From protection to prevention*.

35. de Leeuw J., Vrieling A., Shee A., Atzberger C., Hadgu K.M., Biradar C.M., Keah H. and Turvey C., *The Potential and Uptake of Remote Sensing in Insurance: A Review*, *Remote Sensing* 2014, vol. 6, 10888–10912; doi:10.3390/rs61110888.

36. Rumson A.G., Hallett S.H., *Innovations in the use of data facilitating insurance as a resilience mechanism for coastal flood risk*, *Elsevier, Science of the Total Environment*, vol. 661 [2019] pp. 598–612.

more accurate valuation, lower operating costs and automated customer interactions, leading to faster claims payments.³⁷

This trend and the technical capabilities give insurance the necessary power to effectively mitigate or eliminate risk by (1) preventing the occurrence of an insured event; (2) providing warnings of the likely occurrence of an insured event, enabling the insured to take action on their own; and (3) taking action after an event has occurred, and mitigating its consequences by reducing or avoiding losses.

The preventive potential of new technologies is visible at all stages of the insurance value chain, i.e., in the product design process, where models are created to predict the frequency and severity of claims; in the distribution and marketing process; as well as in underwriting, where factors such as the identification of risky behaviour by insured persons in the past can be tracked, thus enabling a more accurate calculation of premiums. Finally, this is visible also at the post-contract stage, when the behaviour of the insured can be stimulated by encouraging or imposing good practices on the insured in order to mitigate loss events, as well as by predicting the results of the insured's behaviour and even tracking the insured's behaviour by relying on connected devices. For example, monitoring driving style through telematics devices not only serves to assess risk but also has a significant and *immediate* impact on the behaviour of drivers who are aware of the presence of such a device. This means that moral hazard can be reduced.³⁸

In this context, it is worth mentioning the Internet of Things, advanced image analysis provided by satellites,³⁹ and health insurance based on genetic data.⁴⁰ For example, the rapidly growing use of satellite imagery in various areas of life over the past few years leaves no doubt as to its usefulness in insurance. The observational capabilities of satellites, which provide highly accurate data, have increased dramatically in recent years, as have the technical capabilities for processing these data. Satellite data is an essential source of information for analysing natural hazards, both in terms of short-term weather changes and long-term observations of climate change. However, reinsurers point out that although satellite imagery has been available for decades, insurers are reluctant to use it for risk management. To fully exploit the potential of this source of data and information, data providers and users need to cooperate more closely.

2.2 The context of risk prevention management and regulation

Drawing on the history of the insurance industry, it should be recalled that insurers, particularly in the United States, suffered greatly from the unpredictability of losses caused by natural

37. IAIS, *Issues Paper on Increasing Digitalisation in Insurance and Its Potential Impact on Consumer Outcomes*, 2018, <https://www.iaisweb.org/page/supervisory-material/issues-papers>; [access: 15.12.2023]; IAIS, *Issues Paper on the Use of Big Data Analytics in Insurance*, [February 2020]. <https://www.iaisweb.org/page/supervisory-material/issues-papers>, [access: 25.05.2024]; Malinowska K, *Risk assessment in insurance and new technologies in the context of insurance contract principles*, Prawo Asekuracyjne 2/2019.

38. Swedloff R., *The New Regulatory Imperative for Insurance*, Boston College Law Review, 2020.

39. Insurance Institute of Canada, *Artificial Intelligence and Big Data. Implications for the Insurance Industry in Canada*, 2021.

40. Klein R., *Genetics and Life Insurance. In view of the Microscope of Regulation*, The Geneva Association, June 2017. https://www.genevaassociation.org/sites/default/files/ga2017_globalageing_genetics_and_life_insurance_0.pdf [access: 12.05. 2026].

disasters as early as the beginning of the twentieth century. A famous example is the flooding along the Mississippi River in the 1920s, which led to the collapse of many insurers and convinced many others to stop offering flood protection.⁴¹ This led to an increasing burden on governments. Therefore, the preventive potential of insurance is important not only from the perspective of prudent policyholders, but also from that of governments. This can be seen in the recent wildfires in California, where insurance companies responded quickly to help policyholders and even co-operated in efforts to prevent the fires from spreading.

The risk landscape described above, together with the development of new technologies, poses challenges in terms of both management and regulation. In the case of the California fires, the preventive potential of insurance has already become the subject of public debate, which is likely to result in corresponding regulations requiring insurers to adopt preventive measures. This is also a consequence of the behaviour of the insurance market, i.e. the impact of the very high volume and value of claims on insurance rates and even on the availability of insurance cover.⁴² The paradigm shift in the purpose of insurance services and their added value therefore appears to be an inevitable development trend.⁴³ Although the beginning of the shift from risk transfer to risk prevention is naturally dominated by debates about its profitability, it is clearly becoming a subject of management and social policy for governments, which must ensure the 'inclusiveness' of insurance services, regardless of access to the Internet and IoT devices.

How should an optimal risk prevention model be designed if insurance is to become an integral part of sustainable development in contemporary societies? And how could it be shaped to prevent the risk of leaving the issue of prevention legally unaddressed, which could result in missed opportunities that risk prevention offers for sustainable development? This is an issue that should be analysed in detail at policy and management level, so that it can then be regulated at all stages of the insurance supply chain and in all relationships, i.e. between the insurer and the insured, as well as the intermediary.⁴⁴

In fact, insurance prevention has its roots in the insurance tradition and is indeed an extremely complex issue, requiring simultaneous consideration of the social, legal and technical insurance contexts. Although existing legal systems are almost silent on the legal consequences of insurance prevention for the nature and function of insurance, legal questions still await answers. Although both doctrine and, at times, legislation entrust insurers with a preventive function, legal regulations in this area are still lacking.⁴⁵ At the same time, such provisions as do exist, rarely develop this role

41. American Insurance Association, *Studies of Floods and Flood Damage, 1952–1955* (New York: American Insurance Association, 1956), pp. 3–6; van Doren P., *The National Flood Insurance Programme Solving Congress's Samaritan's Dilemma*, CATO Policy Analysis, 2 March 2022, No 923; Kousky C., Cooke R., *Explaining the Failure to Insure Catastrophic Risks*, The Geneva Papers on Risk and Insurance. Issues and Practice, Vol. 37, No. 2, Special Issue on Climate Risk and Insurance (April 2012), pp. 206–227.

42. Ellfeldt A., *California bill would force insurers to consider wildfire mitigation*, 19 April 2024, <https://www.eenews.net/articles/california-bill-would-force-insurers-to-consider-wildfire-mitigation/> (access: 14.05.2026).

43. See the two latest reports published by the Geneva Association: Schanz K.U., *The value of insurance in a changing risk landscape*, Geneva Association, 2023, and Flückiger I., Carbone M., *From Risk Transfer to Risk Prevention How the Internet of Things is reshaping business models in insurance 2021*.

44. Sangowski T., *Ubezpieczenia Gospodarcze*, Warsaw 2001, pp. 102–103.

45. Older case law on this subject includes Szpunar J., *Przesłanki Prewencji ubezpieczeniowej* [*Premises of Insurance Prevention*], *Ruch Prawniczy, Ekonomiczny i Socjologiczny* [Legal, Economic and Sociological Move-

beyond very general measures, such as financing road safety campaigns or fire extinguishers.⁴⁶ Some changes in this approach can be seen in jurisdictions (such as California in the US) where serious social or environmental threats have already materialised.

3. Ethical Aspects of Big Data Use in Insurance Prevention

The dynamic development of Big Data technology opens new opportunities for the insurance sector, particularly in risk prevention. One can observe both the opportunities and ethical challenges that the use of large data sets brings to insurance activities. This issue takes on particular significance in the context of personal insurance, especially life insurance, where processed data touches upon the most intimate spheres of the lives of insured persons.

Undoubtedly, Big Data technology represents an asset for the insurance industry, offering a broad spectrum of benefits to insurers, policyholders, insured persons and beneficiaries of insurance cover⁴⁷. The use of advanced data analysis enables more precise risk assessment, which consequently leads to better suited premium pricing. Equally important, this technology is being applied on an ever-widening scale in preventive activities, allowing for the identification of potential threats and the implementation of preventive measures. However, it is precisely in this context that a series of ethical dilemmas emerge, requiring in-depth reflection and an appropriate regulatory approach.

One of the challenges is the issue of privacy and personal data protection. The collection and analysis of enormous volumes of personal data may be associated with a potential risk of violating the privacy of data subjects. Not only in insurance practice can one observe cases of data being used inconsistently with the original purpose for which they were provided or being shared with third parties. It should be noted that even anonymised data can be re-identified through the application of appropriate analytical techniques, generating additional threats to individual privacy⁴⁸.

Ensuring an appropriate level of transparency and obtaining informed consent for data processing is also of crucial importance. The absence of transparency and informed consent in the data collection and analysis process may lead not only to potential legal violations but can also result in the erosion of client trust in insurance undertakings. It is important to develop clear standards

ment], No. 1, 1973, <https://repozytorium.amu.edu.pl/handle/10593/19461> [access: 14.05.2026]; Mogilski W., *Prewencja ubezpieczeniowa. Zagadnienia prawne.*, Warsaw 1980; Schlesinger H., Venezian E., *Insurance Markets with Loss-Prevention Activity: Profits, Market Structure, and Consumer Welfare*, *The RAND Journal of Economics*, vol. 17, no. 2, [RAND Corporation, Wiley], 1986.

46. This lack of a comprehensive approach is also emphasised by Mogilski W., *Prewencja – niedoceniana funkcja ubezpieczeń*, in: *O dobre prawo dla ubezpieczeń. Księga jubileuszowa Profesora Eugeniusza Kowalewskiego*, [eds.] E. Bagińska, W. Mogilski, M. Wałachowska, Toruń 2019.

47. See, for example: Eling, M., Kraft, M., *Big data, risk classification, and privacy in insurance markets*. *The Geneva Risk and Insurance Review*, vol. 49, 2024.

48. See, for example: Recital 26 of the GDPR; also Rocher, L., Hendrickx, J.M., de Montjoye, Y.A. *Estimating the success of re-identifications in incomplete datasets using generative models*, *Nature Communications* 10, 3069 [2019]. <https://doi.org/10.1038/s41467-019-10933-3> [access: 14.05.2026]; Gadotti A., Rocher L., Houssiau F., Crețu A-M., et al., *Anonymization: The imperfect science of using data while preserving privacy*, *Science Advances*, The American Association for the Advancement of Science, vol. 10, Issue 29, July 2024, DOI: 10.1126/sciadv.adn705, [access: 14.05.2026].

of client communication in terms of what data is processed, when and for what purpose.⁴⁹ Particularly complex ethical challenges emerge in the context of using health data in life and health insurance. While, in property insurance, access to metadata appears relatively unproblematic and justified by the nature of insurance coverage, in personal insurance, insurers deal with sensitive data in the meaning of Article 9 (1) of the General Data Protection Regulation (GDPR).

Health data may include, for example, information related to lifestyle, habits, use of stimulants, and past or current illnesses. When collected for a single policyholder, such data remains individual in character. However, when systematically gathered for families, generations, or groups sharing identifiable traits, it undergoes a qualitative transformation: through aggregation and actuarial analysis. Individual records become the basis for inferring characteristics attributable to the group as a whole – including the probability of an insured event, such as the onset of a specific illness. At that point, the data ceases to function as merely individual and acquires a collective dimension, capable of being projected onto each or most members of the defined group.⁵⁰

Yet even with large research samples and highly specified datasets, general health data – concerning lifestyle, medical history, or habits – may yield ambiguous or inconclusive results, as the variables involved are numerous and their interplay complex.

Genetic data presents a fundamentally different case. Unlike general health information, genetic data is inherently relational: it concerns not only the insured individual, but an entire circle of potential or currently insured persons connected by biological descent. A single genetic profile may reveal medically relevant information about parents, siblings, children, and even distant relatives. Consequently, an insurer in possession of such data may effectively hold health-related information concerning entire families, raising fundamental questions about the boundaries of permissible use of data that was nominally collected in respect of one individual.⁵¹

Indeed, the sensitivity of genetic data has led several European jurisdictions to deny insurers access to genetic data altogether. For example, under Article 37 sec. 1 of the Polish Act on Insurance and Reinsurance Activity,⁵² an insurer may require the prospective insured to undergo medical or low-risk diagnostic examinations for underwriting purposes, but genetic tests are expressly excluded from the permissible scope of such examinations.

In this area, questions arise that go beyond legal frameworks and touch upon fundamental ethical concerns. **Chief among them is the question** of whether, and to what extent, data of the kind discussed above – relating to genetic predispositions or family medical history – **may legitimately** be used for preventive purposes. Although this issue may at first seem marginal, especially when we look at prevention being more readily associated with property insurance than with personal lines, **it is increasingly encountered in practice, particularly as insurers seek to leverage health-related data for risk mitigation and early intervention programmes.** The growing application of Big Data

49. Big Data Analytics in Motor and Health Insurance: a thematic review, EIOPA 2019; https://register.eiopa.europa.eu/Publications/EIOPA_BigDataAnalytics_ThematicReview_April2019.pdf [access: 15.03.2026].

50. See: Mantelero, *From Group Privacy to Collective Privacy: Towards a New Dimension of Privacy and Data Protection in the Big Data Era*. in: Taylor L. et al. (red.), *Group Privacy*, Springer Verlag, pp. 139–158.

51. For further reference please see for example: Gordon D.R., Koenig B.A., “If relatives inherited the gene, they should inherit the data.” *Bringing the family into the room where bioethics happens.*, *New Genetics and Society*, 41 (1); Á Costello R., *Genetic Data and the Right to Privacy: Towards a Relational Theory of Privacy?*, *Human Rights Law Review*, Vol. 22, Issue 1, March 2022, ngab031, <https://doi.org/10.1093/hrlr/ngab031> [access: 12.05.2026].

52. Act dated 11 September 2015 on Insurance and Reinsurance Activity, (consolidated text: J.L. 2025 item 1526).

in insurance may require some regulatory adjustments. What is needed is a principled framework that integrates ethical considerations into decision-making at every stage – from data collection and profiling to underwriting and claims assessment. This does not mean abandoning the use of available data; rather, it means anchoring its use in clearly articulated safeguards, such as purpose limitation, data minimisation, and meaningful transparency towards policyholders⁵³. It looks like an approach grounded in specific, enforceable principles, rather than broad appeals to balance and should enable the insurance sector to realise the potential of data-driven innovation while maintaining social trust and respecting fundamental values such as privacy and individual autonomy.

4. Paving the way for risk prevention: the case of Lloyd's of London – lessons from the past

The prevention of risk by insurance companies is not an entirely new concept. Soon after the Great Fire of London in 1666, which claimed more than 13,000 houses, 87 churches, and the Royal Exchange and the Guildhall⁵⁴ among many other public buildings and businesses, insurance companies in England began to establish their own fire brigades⁵⁵, tasked with the protection of insured buildings. These companies issued 'fire marks', metal plates fastened to walls to identify properties under their protection. Remarkably, for the period in question, premiums were often doubled for timber houses compared with those made of brick, further incentivising risk prevention⁵⁶.

However, probably the most striking example of British insurance prevention rendered by an insurer was that of Lloyd's of London, which was not so much an insurance company in the modern sense as an association of underwriters, with a continuous history of marine underwriting since 1601⁵⁷. Among the initiatives directly or indirectly influenced by Lloyd's were Lloyd's List, Lloyd's Register of Shipping and lobbying for the establishment of lighthouses along the British coast, to name just a few.

In the eighteenth century, Lloyd's of London was an established entity, exerting far-reaching sway and influence. Even prime ministers had to remain on good terms with Lloyd's. It was a real power within the state, influencing numerous laws of the era and shaping the marine and commercial markets, but also directly funding risk-mitigating undertakings, of which the invention of the lifeboat may be the most striking example.

Henry Greathead⁵⁸ was an ambitious young boat-builder from Yorkshire, who took to sea immediately after finishing his apprenticeship. Unfortunately, the voyage he joined, on board a ship

53. Following article 5 of the Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC [General Data Protection Regulation], [2016] OJ L 119/1.

54. Rawlings P., *The Great Fire of London and the Origins of Fire Insurance: A Brief Note*, Queen Mary University of London, School of Law Legal Studies Research Paper No. 246/2015, pp.3.

55. Probably the first such company was The Hand in Hand Company established in 1699.

56. Ibidem, p. 4

57. Kemp P., *The Oxford Companion to Ships and the Sea*, Oxford 1976, p.490.

58. Martin F., *The History of Lloyd's and of Marine Insurance in Great Britain*, Macmillan and Co, London 1876, Kessinger's Rare Reprints, pp. 211–216. It is vital to note that this story comes from a single book, first published in 1876 and requires further research and collaboration from other sources.

supposedly bound for the West Indies, was a fraud – a practice that was very common at the time. Its rather insignificant cargo was heavily insured, and the ship was deliberately run onto a sand-bank a few miles off Calais. Greathead, who realised the scheme, together with the members of the crew he led, intercepted the captain and his mate during their attempted escape and sent a distress signal. Before the Calais authorities, the captain claimed that the loss of the ship was due to the weather and attempted to force the crew to corroborate this lie in writing.

Greathead not only refused and persuaded many of the crew not to sign but also wrote to the Lloyd's underwriters informing them of the scheme. In consequence, underwriters refused to pay out on the policy. This very act earned him the immense gratitude of Lloyd's, which bore fruit in later years.

Upon his return to England after many adventures, including being the victim of impressment, being taken as a prisoner of war and visiting many ports and shipyards in North America, Greathead set out to design a boat that would be able to sail rough seas and rescue wreck survivors. Unfortunately, being quite poor, he lacked the necessary funding to do so. In order to remedy that problem, he contacted the underwriters with whom he had been in touch while in Calais. James Forsyth and Peter Warren (partner of the famous John Julius Angerstein, one of the New Lloyd's Coffee House founding subscribers, commemorated as the 'Father of Lloyd's')⁵⁹ not only sent him liberal donations but also had his designs examined by competent persons, who deemed them very good.

Greathead changed and developed his designs many times, with constant encouragement and funding from the underwriters, who also recommended him to the Duke of Northumberland, who took a great interest, visited his place of business and promised to pay all the expenses connected with the actual building of the first boat.

Greathead wanted to call them 'safety boats', but the duke, wisely, advised him to use the name 'lifeboat'. In the autumn of 1789, the first boat, fittingly called 'Northumberland', was finished. It was manned by ten men with oars, was the same shape fore and aft so it could be rowed in either direction, and was steered by two additional oarsmen. Additionally, it was equipped with a cork casing to improve its buoyancy and copper plates for rigidity when approaching distressed vessels in raging seas⁶⁰. In the middle of November 1789, it was used to rescue seven crew members of 'Edinburgh'. It was a great success, which was reported in newspapers and attracted considerable public attention. However, the government, preoccupied with trade routes, guns and men-of-war, left the matter to private enterprise.

The matter was, once again, taken in hand by Lloyd's. On 20 May 1802, on the initiative of John Julius Angerstein, a resolution was laid before a General Meeting of the Subscribers of Lloyd's, which was passed and granted £2,000 to encourage lifeboats to be stationed in various hazardous parts of the three kingdoms. In total, 14 lifeboats were built and equipped, and the scheme continued to be funded by Lloyd's until 1824, when the National Lifeboat Institution took over under the fitting presidency of the Duke of Northumberland.

The above story illustrates the power of insurance distribution to encourage a significant leap in risk prevention. Lloyd's of London was in a position to bring about long-lasting change and to persuade governments to initiate risk prevention schemes or, where that was not possible, to fund such

59. Hodgson G., *Lloyd's of London. A Reputation at Risk*, Allen Lane, Penguin Books, London 1984, p. 53.

60. Kelly M., Ó Gráda C., Solar P.M., *Safety at Sea During the Industrial Revolution*, UCD Centre for Economic Research Working Paper Series, No. WP19/25, p. 29.

schemes itself. The key issue is: what can be learned from this? The question remains whether modern insurance companies can once again play such a crucial role in risk prevention and in shaping the fate of society. A further question is how we, as academics, can help to facilitate such a future.

5. Prevention in PEICL in the context of Polish regulation. Lessons for the future.

Based on the experiences resulting from individual systems and case law, and as a consequence of comparative legal research, a relevant proposal was introduced in the European project Principles of European Insurance Contract Law (PEICL, also referred to in the literature as Insurance Restatement).⁶¹

The essence of the solutions derived from comparing these standards in national legal orders is reflected in PEICL, where, Article 9:102 of the draft ('Reimbursement of costs incurred in connection with the application of preventive measures') provides that: (§ 1) the 'insurer should reimburse the costs incurred or the equivalent of the damage suffered by the policyholder or the insured resulting from the application of measures to reduce the size of the damage to the extent that the application of these measures by the policyholder or the insured was justified in the given circumstances, even if it turned out to be ineffective'. However, this rule is further developed in the formulation of the insurer's financial duty, namely that the insurer 'should fulfil the benefit to the policyholder or the insured, respectively, if the measures referred to in § 1 above were applied, even if together with the compensation the sum exceeds the sum insured' (§ 2).⁶² As for the concept of reasonable measures, it is to be guided by the circumstances, which points to the predominance of the objective criterion in national legislation, since only German legislation indicates the subjective criterion (see also: Article 826 of the Polish Civil Code), and the *bonus pater familias* criterion [taking into account both subjective and objective factors] applies in Belgian, Luxembourg and Italian legislation⁶³. A common feature of these national solutions is captured in the Roman statement: *ad impossibilia nemo obligatur*.

It is worth recalling Article 4 sec. 9 point 4 of the Polish Insurance and Reinsurance Activity Act.⁶⁴ On this basis, the insurance company undertakes, and is obliged, to primarily finance preventive measures taken within the framework of an individual insurance relationship by the policyholder or other entities. At the same time, it should be assumed that this is a category of insurance

61. More detailed: Fuchs D., *Obowiązki (powinności) prewencyjne w świetle prawa prywatnego i publicznego scilicet spei permultum sed rei paulum*, Prawo Asekuracyjne, nr 2 [103] z 2020 pp. 51–71; also see: idem: *Restatement of European Insurance Contract Law a koncepcja polskiego kodeksu ubezpieczeń*, in: Kowalewski E. (red.), *O potrzebie polskiego kodeksu ubezpieczeń*, Toruń 2009, pp. 125–142; idem, *Konsument w ubezpieczeniach. Szczególne unormowanie w europejskiej regulacji umowy ubezpieczenia*, in: Monkiewicz J., Orlicki M. (eds.), *Ochrona konsumentów na rynku ubezpieczeniowym w Polsce*, Warszawa 2015, p. 211 et sqt.

62. Fuchs D., *PEICL jako materialnoprawny projekt europejskiego instrumentu opcjonalnego w zakresie prawa jednolitego o umowie ubezpieczenia*, in: Fuchs D., Malinowska K., Maśniak D. (eds.), *Kontrakty w ubezpieczeniach*, Warszawa 2020; The PEICL text citations are based on the translation Fuchs D., Szymański Ł., Boguska M. in: J. Basedow et al. (eds.), *Principles of European Insurance Contract Law (PEICL)*, Köln, pp. 657–688.

63. Basedow J. et al. (eds.), *Principles of European Insurance Contract Law (PEICL)*, p. 261.

64. Zawadzka P., in: Wajda P., Szczepańska M., (eds.), *Ustawa o działalności ubezpieczeniowej i reasekuracyjnej. Komentarz*, Warszawa 2017, p. 97.

activity within the meaning of both domestic and EU legislation.⁶⁵ However, the function of this solution is generally broader than merely supplementing the requirements of private law, because *expressis verbis*, the insurance company performs an insurance activity when it prevents the occurrence of random events or acts to reduce their effects and finances these activities from the prevention fund.

Of course, a separate topic specifically regulated in Polish insurance law is the issue of prevention and mitigation in relation to civil liability insurance, in particular motor vehicle insurance.⁶⁶

At the same time, two issues, which are regulated in the PEICL and can be analysed in relation to the Polish regulation of prevention and mitigation in Article 826 of the Polish Civil Code, are important.⁶⁷

Firstly, by way of compromise – primarily between the different approaches to prevention and mitigation obligations in the legislation of individual EU Member States – it was finally accepted that the prevention obligation in the PEICL project would materialise from the moment the damage occurred. In other words, greater emphasis is placed on insurance mitigation in this solution. This element also marks a point where this approach differs from Polish legislation *de lege lata*.

Secondly, PEICL resolves a dispute that has existed mainly in Polish insurance practice, unsupported by representative court rulings or doctrinal statements (lively discussions during the work of the Project Group on a Restatement of European Insurance Contract Law), but which has been present since the entry into force of Article 826 of the Polish Civil Code in its current wording, i.e. since 10 August 2007. This dispute is the result of different (often contradictory) answers to the question of whether the payment of prevention and mitigation costs causes exhaustion of the sum insured (namely, whether it is counted towards the sum insured).

The European project provides for an unlimited reimbursement of justified prevention costs, which is to be welcomed as a sign of the promotion of the idea of insurance prevention on an EU-wide scale. However, it should be emphasised that the adoption by the authors of the solution proposed in § 2 does not mean a complete detachment from the issue of the sum insured and the value of the insured object (by analogy: Articles 824 and 824¹ of the Polish Civil Code). In the event of underinsurance, the consequence resulting from Article 8:102 second sentence, applies: 'when the insurer offers cover in accordance with para. 1, it shall be entitled alternatively to offer insurance on the basis that the indemnity to be paid shall be limited to the proportion that the sum insured bears to the actual value of the property at the time of the loss. In that case, moreover, mitigation costs, as defined in Article 9:102 PEICL shall be reimbursed in the same proportion'.⁶⁸

65. See: Leśniak D., *Usługi bankowe i ubezpieczeniowe w świetle regulacji prawa międzynarodowego, wspólnotowego i polskiego*, Kwartalnik Prawa Publicznego 2006, nr 4, p. 38.

66. More detailed: Fuchs D., *Prewencja i ratownictwo w ubezpieczeniach odpowiedzialności cywilnej, czyli jaki jest ogład świata w ubezpieczeniach obowiązkowych w świetle interpretacji art. 439 k.c.*, Prawo Asekuracyjne nr 1 (106) 2021, p. 68–82.

67. More detailed: Fuchs D., *Obowiązki (powinności) prewencyjne w świetle prawa prywatnego i publicznego scilicet spei permultum sed rei paulum*, Prawo Asekuracyjne, nr 2 (103) z 2020 p. 51–71.

68. The views expressed in the text are the personal views of the author and cannot be identified with the position of the Project Group on a Restatement of European Insurance Contract Law or with the official commentary of this group on the content of the Principles of European Insurance Contract Law. For details and literature on the issue of underinsurance, see Fuchs D., *Komentarz do art. 824 k.c.*, in: Fuchs D., Malinowska K., Maśniak D. (eds.), *Kontrakty w ubezpieczeniach*, Warszawa 2020.

Conclusions

Taking into account the above considerations regarding the role of risk prevention in insurance and, through insurance, its role in society, the authors have reached the following conclusions:

a. Risk prevention as a principle of insurance

Risk prevention, although underestimated by regulatory authorities, should be recognised as one of the principles of insurance, working in conjunction with the principles of utmost good faith, reasonable expectations, and compensation. This should naturally entail appropriate rules at the legislative level to ensure an equal distribution of preventive rights and obligations between the parties and to promote the ‘inclusiveness’ of insurance.⁶⁹

One concern about the use of new technologies in insurance is that knowledge about risk, and about how to prevent it, is now increasingly in the hands of insurers, to the detriment of policyholders, who are the ultimate owners of the risk. So far, it seems that insurers have mainly been using technology to verify the intentions and proper behaviour of policyholders, rather than to prevent insured events. Insurers still mainly seem to play the role of indifferent observers, even though they are technically capable of intervening and increasing the chances of preventing an insured event or mitigating the losses caused by such an event. With this in mind, technology raises questions about the role of the insurer in the insurance contract.

These questions concern the compatibility of the use of new technologies with established principles of insurance contracts, such as good faith, reasonable expectations and compensation. They also raise concerns about whether new tools and technical capabilities may naturally give rise to new obligations for insurers that would be consistent with these principles. This is not limited to any one specific jurisdiction, but is transnational and interdisciplinary in nature, and affects all legal systems and insurance cultures. As insurance plays a vital role in strengthening new industries and ensuring stability across all sectors, the changing function of insurance will undoubtedly influence the transformation of economies, especially those that are environmentally and socially sensitive.

b. The preventive role of communication

When the first insurance regulations were drafted, it was impossible to foresee the speed of data processing, its interconnections and sources. Today, insurers have a significant advantage in accessing data from various sources, often without the customer's knowledge. This change means that knowledge about risk has shifted from policyholders to insurers, reducing the role of the insured in providing information. Policyholders now mainly consent to the collection of data by insurers. Regulators have noticed this development and are addressing it in new regulations on AI and open insurance-related data. Prevention, if seen only as actions directly preventing losses, is not explicitly addressed in current regulations.

69. The World Bank Group, 2018; *How technology can make insurance more inclusive*. <https://openknowledge.worldbank.org/handle/10986/30059> [access: 14.05.2026].

Much better results are achieved if preventive measures are seen as both actions and communication between the parties aimed at preventing risk. This raises the question of whether insurers should share risk information with policyholders to prevent or mitigate events. Prevention should reflect the principle of good faith, requiring transparency from both parties.

European insurance regulations continue to impose asymmetric informational obligations on the parties, even though insurers often know more about risks than policyholders. Current rules require policyholders to disclose risk information, while insurers only provide formal details on their part. This does not reflect the modern reality, where insurers have independent access to risk data through new technologies. The outdated concept of risk disclosure needs to be revised to reflect insurers' specialisation, access to information and protection standards for policyholders. Insurance regulations should provide a clear and transparent picture of risk, given that insurance contracts manage intangible risks. Mutual obligations to disclose risk are essential for prevention. Insurers are not required to share risk information that could prevent damage, except for the soft law of PEICL⁷⁰, which only vaguely suggests the disclosure of relevant information at the request of the policyholder. Extending insurers' disclosure obligations could fill existing gaps. In addition, questions arise about insurers' obligations to take preventive action and actively participate in mitigating both the consequences of losses and the likelihood of such events.

c. Preventive insurance obligations and prevention

The preventive measures to be taken by policyholders are regulated in several insurance laws, but in an inconsistent manner. The PEICL provisions can be cited as a so-called 'best solution'. PEICL, Article 4:101 states that: 'A precautionary measure means a clause in an insurance contract, whether or not described as a condition precedent to the insurer's liability, requiring the policyholder or the insured to perform or refrain from performing certain acts before an insured event occurs. A "precautionary measure" clause which allows the insurer to refuse to pay all or part of a claim on the grounds of non-compliance is only effective to the extent that the damage was caused by the policyholder or the insured.' The above concept of precautionary measures taken before the risk materialises has been regulated in only a few countries.⁷¹ Most European insurance regulations provide for statutory *sauvetage* obligations after the occurrence of an insured event.⁷² More complex regulations exist in English law, where the obligation to take precautions is represented by the concept of promissory warranty, which is a promise by the insured regarding future behaviour, or that the state of affairs will continue after the conclusion of the contract.⁷³

70. Principles of European insurance contract law; <https://www.ius.uzh.ch/de/research/projects/peicl/peiclin-fulltext.html>, [access 15.12.2023].

71. Basedow J. et al., *Principles of Insurance Contract Law*, Otto Schmidt 2016, p. 188.

72. Basedow J. et al. *Principles of Insurance Contract Law*, Otto Schmidt 2016, p. 189. For example, under French law, an insurer may stipulate that insurance cover will only commence if the policyholder implements certain "preventive measures" or may provide for a reduction in insurance cover to the extent that the policyholder's failure to comply with a "preventive measure" is causally related to the loss. The insured's due diligence, negligence or intent are irrelevant, although the insurer cannot unilaterally terminate the contract on the grounds of non-compliance with the above obligations. French position: Pélissier A., University of Montpellier I, Montpellier, France, AIDA 2012, Precautionary Measures, p. 15.

73. England's position: Habergham J., Myton Law Ltd, Solicitors, Hull, England, AIDA 2012, Precautionary Measures, p. 11.

The above regulatory landscape is one in which most precautions are incumbent upon the policyholder, who should behave like a 'prudent uninsured party', to take reasonable precautions, to take all reasonable steps to secure the subject of insurance and should seek to minimise damage by acting to reduce the financial consequences of damage. On the other hand, despite the insurer's significantly better access to information about impending risks, it is 'only' obliged to reimburse the costs of mitigating the damage (after the occurrence of an insured event). Given this perspective, it seems necessary to change the approach and to begin interpreting insurance contract provisions in a way that takes into account modern technologies and the capabilities of insurers. Insurers could be both allowed and required to actively engage in risk prevention before an insured event occurs.⁷⁴

d. Regulations governing insurance activities

Insurers emphasise that their role in risk prevention is to support risk reduction by policyholders by improving the effectiveness of communication tools, combined with increased access to Internet and smartphones. More and more insurance companies are offering their policyholders smart home device packages as a risk reduction service.⁷⁵ Is all this adequately regulated by law in a way that at least does not create barriers instead of opportunities?

Answers to the question of the role of law in shaping the preventive capabilities of insurers are sought primarily in regulations governing insurance activities. Some analysis has been carried out on the basis of solvency regulations, in particular the Solvency II Directive. Risk mitigation techniques are part of the risk management system of insurance companies.⁷⁶ However, it seems that this operates at the general level of insurance company management and does not refer to activities under individual insurance contracts. It is therefore regulated exclusively in the context of solvency requirements.⁷⁷ Only a few examples of insurance laws in Europe explicitly state the preventive role of insurance.⁷⁸

As with Solvency II, however, the inclusion of preventive measures based on new technologies in insurance activities is not the norm at the global level. On the contrary, some authors point to the existence of regulatory restrictions in this area, stating that the use of new technologies and innovations in underwriting, risk management, distribution and claims settlement may

74. Basedow J. et al., *Principles of Insurance Contract Law*, Otto Schmidt 2016, p. 261.

75. ADB, OECD (2020). *Using Technology and Innovation for Disaster Risk Management and Financing*. Manila/Paris; [Meagher 2019]; Schlesinger H., Venezian E., *Insurance Markets with Loss Prevention Activities: Profits, Market Structure and Consumer Welfare*. The Rand Journal of Economics, Vol. 17, No. 2, [Rand Corporation, Wiley], 1986, pp. 227–38.

76. Directive [EU] 2016/97 of the European Parliament and of the Council of 20 January 2016 on insurance distribution (recast) and Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II).

77. Articles 100 and 108 of the Solvency II Directive. When calculating the Solvency Capital Requirement, insurance and reinsurance undertakings must take into account the impact of risk mitigation techniques, provided that the credit risk and other risks arising from the use of such techniques are adequately reflected in the Solvency Capital Requirement.

78. Article 278 sec. 1 of the Solvency II Directive: 1. Insurance and reinsurance undertakings may establish a prevention fund not exceeding 1% of the premiums written for their own account in the last financial year; see also Mrozowska-Bartkiewicz B., Kędziora K., *Fundusz prewencyjny w działalności ubezpieczeniowej* [Prevention fund in insurance activities], Prawo Asekuracyjne 1/2021.

be somewhat limited by regulatory requirements for insurance in many economies, and adding that current insurance regulations sometimes constitute a barrier to pioneering experiments in preventive solutions, putting insurers at a competitive disadvantage.⁷⁹

As the paper shows, insurers seem to be either unable, or at least not encouraged or required, by insurance law to take preventive or mitigating measures or to support the policyholder in taking such measures. Given the restrictive nature of the rules governing insurance activity, the lack of clear provisions indicating that an insurer may carry out preventive activities not only in general terms (such as financing public information campaigns), but also at the level of an individual insurance contract, or even a service per se, but related to insurance, should be considered a serious obstacle to the development of this path.

e. Final remarks

Insurance is based on trust between insurers and customers. This fundamental promise of protection and reliability must be upheld. The gap in insurance coverage around the world, which has been noted in recent years⁸⁰, is a good place to start strengthening that trust. Based on this assumption, it can be concluded that the obligation of insurers to actively engage in risk prevention stems from the above principles. If we delve into the roots and essence of insurance principles, which are honesty, transparency, care for the interests of the other party and predictability, we are led to conclude that the role of insurance, seen through the prism of legal policy and these fundamental principles, allows it to cover not only the transfer of risk, but also the active prevention of insured risk as a service related to, or even separate from, the insurance contract, but still related to insurance activities.

The relationship between insurance and prevention reflects a dynamic interaction of economic incentives, technological capabilities, informational constraints, and systemic risk characteristics. Current challenges – especially those arising from climate change and ecosystem degradation – have significantly altered the risk landscape, rendering traditional insurance methods inadequate and underscoring the importance of preventive strategies. However, the costs associated with prevention, the limitations of existing information systems, and the unavoidable nature of certain residual risks mean that insurance will remain essential. Future risk management approaches will likely integrate prevention and insurance more closely, supported by improved data systems, stronger public-private partnerships, and technological innovations that broaden the scope of preventable risks. This combined approach provides the most promising path towards sustainable, cost-effective risk management in increasingly complex and interconnected environments.

Increasing the preventive role of insurance may have the effect that many uninsurable risks will become insurable thanks to the technical possibility of managing, controlling and preventing them. This is obviously important for inclusiveness, which will then be more than a mere postulate. An equally important trend resulting from the opportunities offered by technology is risk prevention as part of a holistic approach to risk assessment by insurers. This holistic approach, already

79. Fluckiger I., Carbone M., *From Risk Transfer to Risk Prevention*, Geneva Association 2021.

80. Geneva Association, *Understanding and Addressing Global Insurance Protection Gaps*, 2018, https://www.genevaassociation.org/sites/default/files/research-topics-document-type/pdf_public/understanding_and_addressing_global_insurance_protection_gaps.pdf; (access: 15.12.2023).

known as the ‘risk prevention framework’, has the potential to change risk management processes of both insurers and insured organisations.

Risk prevention, which is directly linked to sustainable development goals, needs to be properly recognised by governments in order to benefit all stakeholders – insurers, policyholders and society – by building a culture of risk prevention and reducing public expenditure on healthcare, social security, catastrophic fund payments, etc.

In the conclusion of the study, the authors argues that risk prevention in insurance should go beyond the concept of a business model and become an integral part of insurance and distribution activities in insurance, appropriately reflected in insurance regulation. This would require further regulatory change from a product-focused to a customer-focused approach, allowing not only insurance protection to be offered, but also risk prevention and mitigation services, either as part of insurance or as a separate service.⁸¹

Risk prevention as part of insurance cover must be regulated in private law as an emanation of the principle of good faith and compensation, as well as insurance market regulation as a reflection of sustainable development. A future regulatory solution could include the following paths: (1) introducing obligations for insurers to provide information on risks and obligations for both parties to prevent risk, in a symmetrical way, both before and after the risk materialises; and (2) explicitly allowing risk prevention and loss mitigation as a related insurance service.

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Zapobieganie ryzyku ubezpieczeniowemu: wybrane perspektywy i aspekty

Tekst w sposób wieloaspektowy poddaje analizie prewencję w ubezpieczeniach. Przedstawione uwagi mają nie tylko za zadanie opis stanu ekonomiczno – prawnego ale także wskazanie dalszych kierunków rozwoju i znaczenie opisywanych instytucji w sferze nowych technologii i nowatorskich dziedzinach

aktywności. Zwrócono uwagę nie tylko na prawo obowiązujące, ale także na projektowane rozwiązania, jak chociażby PEICL w skali UE.

Słowa kluczowe: prewencja, ograniczanie strat, zrównoważony rozwój, cele zrównoważonego rozwoju (SDGs), zasada dobrej wiary, zarządzanie ryzykiem, umowa ubezpieczenia, prawo prywatne, PEICL.

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