Product Liability and Privacy Protection in the Digital Age: Bridging the Gap Between the PLD and GDPR by Addressing Harm Caused by Software and AI

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Abstract

The Revised Product Liability Directive (RPLD) introduces loss or corruption of data as a compensable form of damage, marking a significant development in EU product liability law. This paper examines the conditions under which damage to data is compensable under the RPLD, with particular attention to AI-enabled products and software. Using a doctrinal legal methodology, the paper analyses the relevant provisions of the Directive, its recitals, and the emerging academic literature. It argues that although the RPLD expands the scope of product liability by recognising data loss, compensation remains subject to significant substantive and procedural limitations, including the definition of a product, restrictions relating to non-professional use of data, and evidentiary challenges in proving defect and causation. The paper concludes that these limitations may undermine effective protection for consumers in the context of AI-related data loss.

1. Introduction

Artificial intelligence and software-enabled products increasingly process, generate, and store large amounts of digital data. As a result, defects in such products may lead not only to physical injury or property damage but also to the loss or corruption of valuable data. The adoption of the Revised Product Liability Directive represents a significant development by recognising loss or corruption of data as compensable damage. However, the scope of this protection and the conditions under which compensation is available remain uncertain, particularly in relation to AI-enabled products. While existing scholarship has analysed the modernization of product liability for AI and software, limited attention has been paid to the legal conditions governing compensation for data loss and the practical limitations of this new category of damage. This paper addresses the following research question:

Under what conditions does the Revised Product Liability Directive provide compensation for the loss or corruption of data caused by defective AI-enabled products and software? and how does this liability regime interact with the GDPR in the protection of data-related harm?

The paper adopts a doctrinal legal methodology, analyzing the provisions of the RPLD, relevant recitals, CJEU case law, and academic literature to determine the scope of protection for data loss

under the Directive. The paper demonstrates that, although the RPLD expands product liability by recognizing data loss as compensable damage, compensation remains constrained by the definition of a product, the consumer-oriented scope of the Directive, and evidentiary difficulties in AI-related cases.

The remainder of this paper is structured as follows; Section 1 analyses the conditions for compensation, including the definition of a data loss, the distinction between professional and non-professional data, and the scope of liable parties. Section 2 examines the concept of a product and the distinction between products, services, and information under the RPLD. Section 3 discusses the concept of the damage and the evidentiary challenges posed by AI systems and evaluates the effectiveness of the RPLD in protecting consumers. Section 4 discusses the non-material harm and its implications under the RPLD. Section 5 examines the defenses available to economic operators that may exempt them from liability for the loss or corruption of consumer data. Section 6 discusses the GDPR and evaluates its interaction with the RPLD in addressing data-related harm.

2. Data loss as a compensable form of damage under the RPLD

From the perspective of artificial intelligence, the Revised Product Liability Directive (RPLD) reflects the European Union's intention to modernize product liability rules in response to technological developments. By expressly including software, AI-enabled products, and other digital technologies within the definition of a product, the RPLD extends the product liability regime to the new generation of products and seeks to harmonies liability for damage caused by such products across the Member States. However, the Directive is limited to AI-related product liability and does not establish a comprehensive liability regime for all harms arising from artificial intelligence. Damage caused by AI that is unrelated to a defective product remains outside the scope of the RPLD and must be addressed under other legal frameworks. The RPLD takes another significant step in expanding its scope by recognizing the loss or corruption of data as a compensable form of property damage, provided that the conditions and other requirements of the Directive are satisfied.

Although the Revised Product Liability Directive recognizes the loss or corruption of consumer data as a compensable form of damage, obtaining compensation in practice remains challenging. In AI-related cases, consumers must prove that the data loss was caused by a defective product. This is often difficult because AI systems operate through complex software, continuous updates, cloud services, and external data sources. Although the RPLD introduces evidentiary facilitation through disclosure obligations and rebuttable presumptions, these mechanisms may not adequately overcome the claimant's evidentiary burden. In particular, the claimant must first establish a plausible claim before obtaining access to relevant evidence, and must satisfy demanding conditions before benefiting from presumptions of defect or causation. Consequently, despite extending product liability protection to consumer data, the RPLD may not fully achieve effective compensation where the technical and organizational complexity of AI systems prevents consumers from proving defectiveness and causation [1].

Furthermore, the RPLD imposes additional limitations on the compensability of damage. Although the Directive applies to all natural persons, compensation for damage to property, including the loss

or corruption of data, is generally restricted to property and data used for non-professional or not exclusively professional purposes [2]. Consequently, the Directive primarily protects consumers and excludes damage arising exclusively in a professional or commercial context. The same limitation applies to the protection of data. While the RPLD recognizes the loss or corruption of data as a compensable form of property damage, compensation is available only where the damage results from a defective product, the damaged data falls within the Directive's protected scope, and the claimant satisfies the conditions laid down in the Directive. Accordingly, not every instance of data loss caused by AI gives rise to product liability; only data loss that meets the requirements of the RPLD is compensable.

2.1. Definition of product

In assessing the relation between product liability and the protection of personal data, a fundamental issue is whether the damage is sufficiently connected to a product. Although the Revised Product Liability Directive (RPLD) recognises the loss or corruption of data as a compensable form of damage liability arises only where that damage is caused by a defective product. Consequently, the definition of a product is central to determining the applicability of the Directive. Damage to data alone is insufficient to trigger product liability. Rather, the claimant must establish that the loss or corruption of data was caused by a product falling within the scope of the RPLD and that the product was defective. Accordingly, the existence of a product that satisfies the Directive's definition, together with a causal link between the defect and the data loss, constitutes a prerequisite for establishing liability under the RPLD [3].

The definition of a product is set out in Article 4 of the RPLD. Pursuant to Article 4(1), all movable items, including those integrated or interconnected into immovable property, constitute products. Compared with the 1985 Product Liability Directive, the revised Directive significantly expands this definition by expressly including software, digital manufacturing files, and raw materials. The explicit inclusion of software and electricity demonstrates the legislature's intention to extend product liability beyond traditional tangible goods to certain digital products. Consequently, where defective software or another AI-enabled product causes the loss or corruption of data, the resulting damage may fall within the scope of the RPLD because such software qualifies as a product under Article 4.

Although the RPLD are clear regarding the inclusion of software as a product but it creates an important exception. According to Recital 13, free and open-source software that is developed or supplied outside a commercial activity is generally excluded from the Directive. The purpose of this exemption is to encourage innovation and research by avoiding liability for non-commercial developers. By contrast, where software is supplied for payment or where a company receives personal data as consideration in the course of a commercial activity, the software falls within the scope of the Directive. This exemption appears only in a recital, not in the binding articles of the Directive, which creates some legal uncertainty. however, the exemption is also criticize by some scholarsas the exemption because free or open-source software can still cause serious harm if it is defective. Therefore, giving it preferential treatment may leave some victims without compensation [1].

However, the Directive does not extend product liability to all digital content or digital services. Although software is expressly recognized as a product, Recitals 2 and 14 clarify that the Directive does not encompass every form of intangible information. This limitation is particularly important in relation to product-related services.

2.2. Product related service

One of the major innovations of the RPLD is the inclusion of product-related services (PRS) within the scope of product liability. Nevertheless, this expansion should be interpreted cautiously. The inclusion of related services does not mean that the Directive applies to services in general. Rather, only services that are integrated/interconnected with, or necessary for, the functioning, control, or maintenance of a product fall within the Directive's scope. By contrast, services that merely provide information remain excluded.

Accordingly, purely informational content—such as media files, e-books, source code that merely constitutes information, or other forms of data that simply communicate information—does not qualify as a product under the RPLD. This interpretation is consistent with the judgment of the Court of Justice of the European Union in *Krone-Verlag* (Case C-65/20), in which the Court held that harm caused solely by incorrect information published in a newspaper does not render the newspaper a defective product. The damage results from the informational content rather than from a defect in the product itself. Importantly, this principle remains valid under the revised Directive [4].

A further issue arising from the digitalization of products concerns the legal status of data and information within the product liability regime. This question is illustrated by the concept of Digital Product Passports (DPPs), introduced under the Ecodesign framework. A DPP is a digital record containing information relating to a product, such as its composition, materials, energy performance, repair history, and other lifecycle information. Unlike ordinary information, a DPP is directly linked to a specific product through a unique identifier and is intended to accompany the product throughout its lifecycle. This raises the question of whether the data contained in a DPP should be regarded merely as information or as part of the product itself.

This distinction is particularly important because the Revised Product Liability Directive (RPLD) applies only to defective products and their components, not to information as such. The Court of Justice of the European Union confirmed this distinction in *Krone-Verlag* (Case C-65/20), holding that harm caused solely by incorrect information does not render the medium containing that information a defective product. However, the legal position of DPPs is less straightforward. Since DPPs are closely integrated with the product and may become a prerequisite for regulatory compliance, such as CE marking, they appear to perform a function that goes beyond the mere communication of information. Consequently, it may be argued that the data contained in a DPP forms part of the product or constitutes a product component within the meaning of the RPLD. Nevertheless, the Directive does not expressly resolve this issue, and uncertainty remains regarding whether defects in DPP data can trigger product liability.

From the perspective of compensation for the loss or corruption of consumer data, this uncertainty is significant. The RPLD recognizes data loss as a compensable form of damage only where it is caused by a defective product. Therefore, whether digital data or information is legally characterised as part of the product, a component of the product, or merely information may determine whether the resulting damage falls within the scope of the Directive. As AI systems and connected products increasingly rely on digital information throughout their lifecycle, clarifying this distinction will become essential for ensuring effective and consistent compensation for damage caused by defective digital products [1].

This distinction is particularly relevant to claims involving the loss of data. Where data loss results from a defect in software, an AI system, or another product falling within the scope of Article 4, the RPLD may provide a basis for compensation. Conversely, where the damage is caused solely by inaccurate or misleading information, rather than by a defect in a product, the Directive does not apply. Therefore, the key question in data-loss cases is not merely whether data has been lost, but whether that loss was caused by a defective product within the meaning of the RPLD.

2.3. Definition of Damage

Compensation for the loss or corruption of data under the Revised Product Liability Directive (RPLD) requires more than merely establishing that data has been damaged. In addition to satisfying the definition of a product under Article 4, the claimant must also meet the conditions relating to the type of compensable damage and the person entitled to claim.

Under Article 6 of the RPLD, the loss or corruption of data is treated as a category of compensable damage comparable to property damage. However, compensation is not available for every instance of data loss. Besides proving that the damage was caused by a defective product, the claimant must also demonstrate that the damaged data was used for non-professional or not exclusively professional purposes. This limitation reflects the consumer-protection objective of the RPLD. Although the Directive formally applies to all natural persons, it primarily seeks to protect consumers in their interactions with manufacturers, producers, and other economic operators. Consequently, protection for data loss is narrower where the damaged data is connected with professional or business activities.

Accordingly, where the loss or corruption of data is caused by a defective AI system, software, or another product covered by the RPLD, compensation is available only if the relevant product is used for personal or not exclusively professional purposes and the damaged data is likewise personal or non-professional in nature. By contrast, where the defective product is used exclusively in a professional or commercial context, or the damaged data relates solely to professional activities, the loss generally falls outside the scope of compensation under the Directive. Therefore, the RPLD does not protect every form of data loss. Instead, compensation depends on the cumulative fulfilment of several conditions including the existence of a defective product within the meaning of Article 4, a causal link between the defect and the data loss, and compliance with the Directive's restrictions regarding the claimant and the non-professional use of the damaged data.

The recital 22 further limits the scope of compensation for data loss under the Revised Product Liability Directive (RPLD). Consistent with the Directive's objective of protecting natural persons rather than businesses, damage to property used exclusively for professional purposes is excluded from compensation. More importantly, the recital adopts an even stricter approach to data. It expressly provides that the destruction or corruption of data used for professional purposes, even where such data is also used for personal purposes, is not compensable under the Directive. The rationale for this limitation is to reduce the risk of excessive litigation and to preserve the consumer-protection focus of the RPLD. Consequently, although the Directive recognises the loss or corruption of data as a compensable form of damage, its protection is largely confined to data used for private or consumer-related purposes. This limitation is particularly significant in the context of AI systems and software, which frequently process both personal and professional data, leaving many instances of professionally related data loss outside the harmonized product liability regime (Recital 22 and 25).

The RPLD further limits the scope of recoverable damage by excluding certain categories of harm from its liability regime. In particular, the Directive provides that pure economic loss, privacy infringements, and discrimination do not, by themselves, give rise to liability under the RPLD. This does not mean, however, that a claimant cannot recover compensation where a defective product causes the loss or corruption of data. Rather, the Directive distinguishes between the loss or corruption of data, which is recognised as a compensable form of damage, and the privacy infringement that may result from that data loss. Consequently, where a defective AI system or software causes the loss or corruption of a consumer's data, the resulting data loss may be compensable under the RPLD, provided that the requirements of the Directive are satisfied. By contrast, the privacy infringement itself, such as the unlawful disclosure of personal data or interference with an individual's privacy, does not constitute a compensable form of damage under the RPLD. Such privacy-related harm must instead be pursued under other applicable legal frameworks, most notably the GDPR or relevant national law. Accordingly, although a single defective product may simultaneously cause both data loss and a privacy infringement, the RPLD compensates only the former, while the latter falls outside its harmonised liability regime (Recital 24).

3. RPLD and non-material harm

The 1985 Product Liability Directive (PLD) harmonised only the rules governing compensation for material damage across the Member States and did not establish a harmonised regime for non-material harm. The Revised Product Liability Directive (RPLD) maintains this approach. Although it takes an important step by recognising the loss or corruption of data as a compensable form of damage, it does not harmonise compensation for non-material harm resulting from that data loss. Article 6(2) and Recital 23 make clear that issues relating to non-material harm remain governed by national law. Consequently, whether a claimant may recover compensation for emotional distress, anxiety, or other non-material consequences of data loss depends on the applicable legal framework of the Member State. This distinction is particularly significant in the context of data loss. The RPLD recognizes the loss or corruption of data itself as compensable, provided that the other conditions of the Directive are satisfied, including that the damage is caused by a defective product

and that the data is not used exclusively for professional purposes. However, the Directive does not extend this harmonized protection to the non-material consequences of losing that data. For example, where a defective AI-enabled storage service permanently deletes a person's family photographs, the loss of the data may be compensable under the RPLD. By contrast, the anxiety, emotional distress, or sentimental loss associated with losing irreplaceable family memories is not harmonized under the Directive and will be recoverable only if the applicable national law provides for such compensation. This creates a significant limitation in the RPLD's protection of individuals, as data loss frequently results in non-material harm that may be more substantial than the material loss itself.

A defective product may cause material damage through the loss or corruption of data. For example, the deletion or corruption of personal family photographs, documents, or other consumer data may constitute compensable damage under the RPLD, provided that the other requirements of the Directive are satisfied. In addition, a claimant may incur financial costs directly associated with restoring or recovering the lost data, such as the expense of professional data recovery services or replacing digital content. By contrast, pure economic loss, where no compensable category of damage recognised by the Directive has occurred, does not by itself give rise to liability under the RPLD [3]. Although these harms are real and may be significant, they are compensable under the RPLD. Since the RPLD does not harmonize compensation for non-material and pure financial harm, recovery of such damage depends on the national law of the Member State. As a result, a consumer may be entitled to compensation in one Member State but not in another.

This creates an important gap in consumer protection. Given that data frequently has emotional or personal value in addition to economic value, limiting harmonization to material damage may leave many victims of defective digital products without effective compensation for the most significant.

Consequently, despite extending product liability to software and AI-enabled products, the RPLD does not provide uniform protection for all forms of harm resulting from the loss or corruption of data.

4. Defenses and their applicability to loss of data

(To Be Completed)….

5. GDPR and interaction with RPLD

5.1 The compensation regime under the GDPR

Unlike its predecessor, Directive 95/46/EC, which left the right to compensation largely to the discretion of the Member States, the GDPR establishes a directly applicable and harmonized right to compensation under Article 82. Nevertheless, while the existence of the right to compensation is governed by EU law, procedural matters, including the assessment and quantification of damages, remain subject to national law, provided that the principles of equivalence and effectiveness are respected. The GDPR adopts a layered enforcement model that combines public enforcement by

supervisory authorities with private enforcement through compensation claims. The Court of Justice of the European Union (CJEU) has consistently emphasized that Article 82 serves a purely compensatory function and is intended to compensate individuals for the damage suffered, rather than to punish infringements or deter future misconduct. The right to compensation under Article 82 GDPR is grounded in the principle of corrective justice, which seeks to restore the injured person to the position they would have occupied had the infringement not occurred [5].

The Court of Justice of the European Union (CJEU) clarified the requirements for compensation under Article 82 GDPR in *UI v Österreichische Post AG* (C-300/21). The Court held that liability arises only where three cumulative conditions are satisfied: an infringement of the GDPR, the existence of material or non-material damage, and a causal link between the infringement and the damage. The CJEU also confirmed that the damage does not need to reach any minimum level of seriousness to be compensable, provided that the claimant establishes the existence of actual damage and the required causal connection.

Article 82 establishes a fault-based liability regime rather than a strict liability regime, requiring a proven infringement and a causal connection between that infringement and the damage suffered. A personal data breach does not automatically constitute an infringement of the GDPR or give rise to liability. A controller may avoid liability by demonstrating that it complied with its obligations under the GDPR, particularly the technical and organisational measures required by Articles 24 and 32, and that it was not responsible for the damage.

However, defining compensation to data breach is challenging because privacy related harm is often difficult to quantify, and may arise from the loss of control over personal data rather than from immediate financial loss. Recitals 75 and 85 GDPR recognise that data breaches may result in physical, material, and non-material harm, including the loss of control over personal data. Nevertheless, quantifying non-material harm remains one of the greatest challenges in the application of Article 82[1].

5.2. Non-material damage under the GDPR

Non material damage is one of the most significant and contested aspects of Article 82 GDPR. Although the GDPR does not define the concept, the Court of Justice of the European Union (CJEU) has clarified that it must be interpreted autonomously and uniformly across all Member States, rather than according to national tort law concepts. Recital 85 adopts a broad approach by identifying various forms of non-material harm that may result from a personal data breach, including loss of control over personal data, discrimination, identity theft, reputational harm, and loss of confidentiality.

1 The Court of Justice of the European Union (CJEU) has further clarified that compensation under Article 82 serves a purely compensatory function, whereas administrative fines under Article 83 pursue punitive and deterrent objective. (Joined Cases C-182/22 and C-189/22 JU and SO v Scalable Capital GmbH [2024] EUECJ C-182/22 (20 June 2024) (ECLI:EU:C:2024:531), para 39.)

The GDPR provides a broad and illustrative list of privacy-related harms in recital 85, indicating its intention to afford extensive protection to data subjects and individuals. As the GDPR does not limit non-material harm to the examples listed in Recital 85, it reflects an intention to provide broad protection against privacy-related harm beyond purely financial loss [6]. From a theoretical perspective, non-material harm is closely linked to the protection of privacy, personal autonomy, and the free development of personality, as unlawful processing or disclosure of personal data may undermine an individual's sense of control and freedom. In practice, the most common forms of non-material damage include anxiety about the future misuse of personal data, emotional distress, reputational harm, and the loss of control over personal data. Through its case law, the CJEU has recognised the importance of these forms of harm and has progressively clarified their role within the scope of Article 82 GDPR [6].

5.3. Lack of Harmonisation of Non-Material Harm

The CJEU has clarified that fear of the future misuse of personal data may constitute non-material damage under Article 82 GDPR, even where no actual misuse has yet occurred. In *Natsionalna Agentsia za Prihodite* (C-340/21), the Court held that compensation may be awarded where the data subject's fear of future misuse is well founded in light of the circumstances of the case. This recognises that a data breach may create a continuing risk to an individual's privacy and identity, giving rise to compensable anxiety or emotional distress. However, the CJEU has also emphasised that compensation cannot be based on purely hypothetical concerns. In *MediaMarktSaturn* (C-687/21), the Court held that a mere GDPR infringement does not automatically result in non-material damage and that the claimant must prove actual harm. Accordingly, while the CJEU adopts a broad approach to compensating fear-based harm, it requires national courts to assess whether the claimant's fear is objectively well founded based on the specific facts of the case (To Be Completed)….

6. Conclusion

The Revised Product Liability Directive represents a significant development in EU product liability law by adapting the liability regime to the digital economy. By expressly recognising software, AI-enabled products, digital manufacturing files, and certain related services as products, and by including the loss or corruption of data as a compensable form of property damage, the RPLD broadens the scope of product liability to address harms arising from modern digital technologies. These developments strengthen consumer protection by enabling compensation for data loss caused by defective products where the conditions of the Directive are fulfilled.

Despite these advancements, the RPLD does not establish a comprehensive framework for the protection of data-related harm. Compensation is subject to several cumulative requirements, including the existence of a defective product, a causal link between the defect and the damage, and the limitation that the damaged data must not be used exclusively for professional purposes. Moreover, the Directive excludes privacy infringements, discrimination, and pure economic loss as independent heads of damage and does not harmonise compensation for non-material harm.

Consequently, where the loss of data results primarily in emotional distress, anxiety, or other non-material consequences, the availability of compensation depends largely on national law, leading to differences in protection across Member States.

The GDPR complements this framework by providing an independent right to compensation for both material and non-material damage resulting from unlawful processing of personal data. Through Article 82 and the evolving case law of the Court of Justice of the European Union, the GDPR adopts a broad understanding of non-material harm, recognising that loss of control over personal data, emotional distress, and well-founded fear of future misuse may give rise to compensation. Nevertheless, the GDPR applies only to personal data and requires proof of an infringement, damage, and a causal link between them.

As digital products increasingly rely on AI systems and extensive data processing, the distinction between product-related harm and data protection harm is becoming less clear. In many cases, the same incident may simultaneously involve a defective product, the loss of personal or non-personal consumer data, and an infringement of data protection law. While the RPLD and the GDPR operate as complementary regimes, important gaps remain, particularly regarding the harmonisation of non-material harm and the interaction between product liability and data protection law. Ensuring effective and coherent protection for individuals in the digital environment will therefore require a clearer articulation of the relationship between these two legal frameworks and further legislative or judicial guidance on the compensation of data-related harm.

References

1. De Bruyne, J., Dheu, O., Ducuing, C.: The European Commission's approach to extra-contractual liability and AI–An evaluation of the AI liability directive and the revised product liability directive. Computer Law & Security Review. 51, 105894 (2023).
2. Directive (EU) 2024/2853 of the European Parliament and of the Council of 23 October 2024 on liability for defective products and repealing Council Directive 85/374/EEC, Recital 22.
3. Rimkutė, D.: The new EU product liability directive: doctrinal analysis. Access to justice in Eastern Europe. 8, 74–97 (2025).
4. Messner-Kreuzbauer, D.: The Revised Product Liability Directive: Open Questions at the Time of Implementation. Walter de Gruyter GmbH & Co KG (2026).
5. Coleman, J.L.: Risks and wrongs. Harv. JL & Pub. Pol'y. 15, 637 (1992).
6. Abrokwa, E.K.: Compensation for Data Breach Victims under Article 82 GDPR: A Critical Analysis. Available at SSRN 7175839. (2026).