

# Manufacturer's liability for continuous product learning

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## Abstract

This paper aims to explore a novel aspect of Directive (EU) 2024/2853 (PLD): the manufacturer's liability for continuous product learning. This is a new criterion for evaluating product defectiveness that integrates artificial intelligence. The PLD pays limited attention to this matter, so the study aims to identify the conditions under which a product's continuous learning might be deemed defective. Firstly, it is argued that this basis for assessing whether a product is defective should be understood to apply to generative AI systems, rather than to AI systems that do not change their behaviour after deployment. Secondly, the ten-year limitation period for holding the manufacturer liable, starting from the time the product was placed on the market or put into service, seems unsuitable for products that undergo continuous learning, as their features may change over time. Thirdly, the crucial factor enabling the manufacturer's liability is that the product remains within the manufacturer's control, allowing modifications to correct defects caused by continuous learning.

## Keywords

manufacturer liability; continuous product learning; autonomous learning; product liability

## Responsabilidad del fabricante por el aprendizaje continuo del producto

### Resumen

El objetivo de este documento es explorar un aspecto novedoso de la Directiva (UE) 2024/2853 (PLD): la responsabilidad del fabricante por el aprendizaje continuo del producto. Este es un nuevo criterio para evaluar la falta de calidad del producto que integra inteligencia artificial. El PLD presta una atención limitada a este asunto, por lo que el estudio tiene como objetivo identificar las condiciones en las que el aprendizaje continuo de un producto podría considerarse defectuoso. En primer lugar, se argumenta que esta base para evaluar si un producto es defectuoso debe entenderse como aplicable a los sistemas de IA generativos, en lugar de a los sistemas de IA que no cambian su comportamiento tras la implementación. En segundo lugar, el período de limitación de diez años para responsabilizar al fabricante, a partir del momento en que el producto se comercializó o se puso en servicio, parece inadecuado para productos que se someten a aprendizaje continuo, ya que sus características pueden cambiar con el tiempo. En tercer lugar, el factor crucial que permite hacer responsable al fabricante es que el producto permanece bajo su control, lo que permite realizar modificaciones para corregir defectos derivados del aprendizaje continuo.

### Palabras clave

responsabilidad del fabricante; aprendizaje continuo del producto; aprendizaje autónomo; responsabilidad del producto

## Introduction

Products with digital elements that include AI systems have emerged in the market and are in high demand by consumers who wish to use such products to enhance the effectiveness of certain actions or tasks. The development of new product technologies and generative artificial intelligence (AI) has made Directive 85/374/EEC obsolete. In this context, the OJEU of 18 November 2024 published Directive (EU) 2024/2853 of the European Parliament and of the Council of 23 October 2024 on liability for defective products, repealing Council Directive 85/374/EEC (PLD),<sup>1</sup> given that, in the field of product liability, the increasing technical complexity of products is leading to greater difficulties in obtaining compensation for damage caused by defective products, particularly due to the challenges in gathering the evidence needed to hold the manufacturer liable for the damage.

The potential for a product to become defective due to the AI system integrated within it is specifically mentioned in Article 7.2.c) PLD, which refers to “the effect on the product of any ability to continue to learn or acquire new features after it is placed on the market or put into service”. The PLD pays little attention to this aspect, that

is, how AI may contribute to a product being classified as defective, as can be observed from a careful reading of its articles and recitals, despite it being one of the newest considerations to be included in the Directive.

Therefore, this work aims to analyse the impact of a product's continuous learning on manufacturer liability after it is placed on the market or put into service, examining how continuous product learning occurs and the extent of measures manufacturers should adopt to mitigate or eliminate the risks associated with AI systems embedded in their products.

### 1. Hardware, software and artificial intelligence: what characterizes a product that incorporates AI?

#### 1.1. A new understanding of products

The main reason for adopting a new directive in this area is to update regulations in response to the complex nature of new products entering the market: namely goods with digital elements that may include AI systems. The key feature of

1. 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 (OJEU No. 2853 of 18 November 2024).

these goods is that they can be classified as either tangible movable goods (hardware) or digital elements. Moreover, in the digital era, not all products are tangible, as digital products or services (such as operating systems, computer programmes, applications or AI systems) have been introduced that are not necessarily part of a tangible movable good but can be downloaded and later integrated into products outside the manufacturer's control (Recital 13 PLD).

The issues concerning the classification of this type of goods as a product under Directive 85/374/EEC are well known (Wanderhorst, 2021, pp. 64-66). This is why the PLD aims to resolve the existing doctrinal debate by including software, digital services, and content within the scope of the new regulation, regardless of how they are supplied. In this regard, Art. 4.1) PLD defines the concept of product as follows: "‘product’ means all movables, even if integrated into, or interconnected with, another movable or an immovable; it includes electricity, digital manufacturing files, raw materials, and software”.

The definition of “product” in the proposed Directive is based on the definition contained in Directive 85/374/EEC. The core element of the new definition of product is that it is movable and can be integrated into another movable or immovable good. So far, the definition in the PLD does not introduce anything new. However, the definition then adds two new concepts not present in the definition of product given by Directive 85/374/EEC, in addition to electricity: digital manufacturing files, raw materials such as gas and water, and software (Recitals 16 and 17 PLD).

Recital 16 PLD provides guidance on interpreting what is meant by “digital manufacturing files”, as opposed to “digital files”. The former includes “the functional information necessary to produce a tangible item”. Therefore, digital manufacturing files are those that contain the information required to create new products. In contrast, according to Recital 16 PLD, digital files cannot be classified as products. These are files that do not contain coded information to produce new items, such as photographs and video or audio files (Recital 13 PLD in fine). The PLD might have referred to such digital files as mere digital content, a

concept used by Art. 2(1) Directive (EU) 2019/770 (DCDS) for files of this kind, thereby ensuring internal coherence with other European legislation on contractual and non-contractual liability.

For its part, Recital 17 PLD refers to digital services. Art. 4 PLD does not contain a definition of the concept of digital services, meaning that the guidance given by Recital 17 PLD is particularly relevant for correctly tackling this concept. However, it is a concept that is also defined in Art. 2.2) DCDS.<sup>2</sup>

According to Recital 17 PLD, in the case of digital services, the criterion of integration into or interconnection with tangible products must be satisfied if the provisions of the PLD are to be applied to this type of product. Although Recital 17 PLD states that it should not apply to digital services as such, its effects should be extended to digital services when these are integrated into or interconnected with products in a way that the product could not perform its functions without them, and within the manufacturer's control. To this effect, Recital 17 PLD mentions, for example, the continuous supply of traffic data in a navigation system. Therefore, in my view, the criterion of whether software or digital services are integrated into or interconnected with products is crucial if the PLD is to apply to damage caused by digital services, especially when these services are a key factor in the product's safety or functionality.

However, a more contentious issue would be an AI chatbot that, unlike the examples provided in Recital 17 PLD, does not determine a product's safety or functionality. In this case, the chatbot is not an AI system that determines a product's safety or functionality; rather, it is a type of software distributed as a service (“software as a service,” or SaaS) that could harm the user as a result of information entered into the system via a dialogue box. For instance, consider a user with a fever asking an AI chatbot for medical advice. In this case, the manufacturer of the computer or smartphone would not be liable under the PLD. Furthermore, Recital 13 PLD clarifies that information shall not be regarded as a product.<sup>3</sup>

2. Directive (EU) 2019/770 of the European Parliament and of the Council of 20 May 2019 on certain aspects concerning contracts for the supply of digital content and digital services (OJEU no. 136 of 22 May 2019).
3. In the same regard, see Herbosa Martínez (2024, p. 74) and Wagner (2023, p. 203). “Imagine a ‘digitised’ version of the Krone case: if the incorrect treatment advice had been published in an electronic newspaper, the publisher would be liable for this under general tort law, but not the manufacturer of the smartphone under the Product Liability Directive”.

Recital 13 PLD clarifies that software, such as firmware, computer programmes, applications or AI systems, are products, regardless of how they are supplied, i.e. whether they are incorporated into the market as standalone products or integrated into other products as components. They are intangible products that fall within the definition of a product in Art. 4(1) PLD. With this categorization, the European legislator closes one of the debates surrounding the definition of product provided in Directive 85/374/EEC.<sup>4</sup> The clarification is welcome for the purpose of increasing legal certainty for injured parties and those affected by defective products: both tangible and intangible products are considered products for all purposes of the PLD.

However, Recitals 13 and 17 PLD must be contrasted, as the concepts of “product” (Art. 4(1) PLD), “related service” (Art. 4(3) PLD), and “component” (Art. 4(4) PLD) have distinct meanings. If intangible elements such as computer programmes, applications, or AI systems are regarded as products (Art. 4.1 *in fine* PLD in conjunction with Recital 13 PLD), it broadens the idea of a product to include intangible products that were excluded from this concept in Directive 85/374/EEC. Now that the concept of a product has been expanded to include intangible products, such items as computer programmes, applications, or AI systems should be considered either as a “related service” or a “component”, since they will be part of devices or machines regarded as products (Art. 4.1 PLD).

Regarding the AI systems elevated by Recital 13 PLD to the category of products, the interdependence or interconnection of these systems with a product, which is the basis for them being considered as a related service or component, follows from the definition in Art. 3(1) AI Act, which emphasises that an AI system is a “machine-based system,” meaning that such systems can also function as a related service or as a component of a tangible product.<sup>5</sup>

Therefore, intangible products such as computer programmes, applications, or AI systems are, beyond any doubt, considered products for the purposes of the PLD,

which represents a step forward from the definition of product given in Directive 85/374/EEC. However, these intangible products must be added to a machine or device, which is why they should be regarded as being incorporated or interconnected as a “related service” or “component” within a tangible or movable product, as long as they are not distributed as SaaS and do not compromise the security or functionality of a product that relies on internet connection services.

Once the concept of product is clearly understood based on the definition in the PLD, it becomes necessary to examine the characteristics of products with digital elements, including AI systems, to understand the risks and impacts of their continuous learning.

## 1.2. Artificial intelligence applied to products

Products, as understood at the time of adopting Directive 85/374/EEC, were subject to the control of the individual, who used them to satisfy his or her needs in accordance with the intended use of the product (Art. 6.1.b Directive 85/374/EEC). Even if they were equipped with software, this, although integrated into the product, was pre-programmed and carried out its functions based on the commands of the individual. Currently, software in products has gained new functionalities, to the point where it can make decisions without following a strict, pre-set, and unidirectional pattern. In other words, the product can make its own decisions depending on its circumstances and the external stimuli it receives (Wagner, 2023; Abbot, 2020, pp. 32-35). This fact indicates that a product containing an AI system can cause harm to third parties due to its unpredictable behaviour. The PLD does not establish different levels of liability based on the AI system's degree of autonomy in continuous learning, in accordance with Art. 3(1) AI Act.<sup>6</sup> There are deterministic computational AI systems where the outcome or prediction is entirely predictable because the system has no autonomous learning capability after deployment. However, deep-learning AI systems can continue learning after deployment, making

4. Supra, note 2.

5. Gómez Ligüerre (2025). “las víctimas de los sistemas de inteligencia artificial lo serán con motivo del uso de un producto, artefacto o aparato que incorpore, de manera principal o como uno de sus componentes operativos uno de tales sistemas que, como los define el artículo 3.1 del Reglamento de IA están ‘basados en una máquina’”.

6. Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (OJEU no. 1689 of 12 July 2024).

it difficult or impossible to trace the final result. In my view, continuous learning as a basis for defectiveness should specifically apply to generative AI systems – those that keep learning from their environment. In contrast, AI systems that do not change their behaviour once on the market cannot be regarded as genuinely engaging in continuous learning. Therefore, I believe this ground for defectiveness should refer to generative AI, which adapts to the operational environment in which the product is deployed (Navas Navarro 2022, 2-5).

## 2. Legal status of the manufacturer: brief reference to the AI Act

On 14 May 2024, the Council endorsed a proposed regulation on artificial intelligence, following its approval by the European Parliament on 13 March 2024. Finally, the ordinary legislative procedure was completed with the publication of the Artificial Intelligence Act (AI Act) in the OJEU on 12 July 2024. One of the key new features of the AI Act is that, in order to protect users and consumers, it will apply to product manufacturers who place on the market or put into service an AI system along with their product and under their own name or trademark (Art. 2.1.e). The European legislator aims to require manufacturers of products incorporating AI to adhere to the obligations of the AI Act when the AI system is integrated or installed in the product.

However, in light of the provisions of Recital 87 AI Act, it appears that the AI Act distinguishes between different functions of an AI system once integrated into a product, specifically recognizing whether the AI system is a “safety component” or not. Recital 87 AI Act emphasises the role of the AI system as a safety component. The concept of ‘safety component’ is defined in Art. 3(14) AI Act as follows: “‘safety component’ means a component of a product or of an AI system which fulfils a safety function for that product or AI system, or the failure or malfunctioning of which endangers the health and safety of persons or property”. Based on these considerations, an AI system functioning as a safety component within a product is responsible for controlling the product’s operation, preventing it from endangering the health and safety of persons.

The fact that the AI system therefore acts as a safety component is one of the factors to consider when determining that the product manufacturer should be required to

comply with the obligations set out in the AI Act (Art. 6.2 AI Act, together with Annex III). However, there are AI systems that do not function as a product safety component, in the sense that they cannot compromise the health or safety of individuals, but which are classified as high-risk by the AI Act. An example of these are consumer credit-worthiness assessment AI systems. In such cases, Art. 2.2 AI Act significantly reduces the legal requirements that manufacturers must meet for products falling under Section B of Annex I AI Act, without affecting the provisions of sectoral legislation applicable to these products.

Art. 25.3 of the AI Act addresses this issue and states that, when a high-risk AI system functions as a safety component of a product listed in Section A of Annex I of the AI Act, the manufacturer must act as the provider of the AI system and comply with the obligations set out in Art. 16 of the AI Act. Examining the harmonized legislative acts listed in Section A of Annex I of the AI Act, they relate to products the malfunctioning of which could be particularly dangerous for people’s health and safety, such as machines, toys, recreational craft, lifts, safety components and others. For this reason, adhering to the legal requirements of Art. 16 of the AI Act is crucial.

This does not mean that the AI Act only covers systems that are safety components of products that fall within the scope of the harmonisation legislation in Section A of Annex I AI Act, rather than an AI system can be classified as high-risk according to the AI Act criteria, but integrated into products mentioned in Section B of Annex I AI Act. In this case, Art. 2.2 AI Act relaxes the obligations of manufacturers whose products include AI systems mentioned in Section B of Annex I. This applies to manufacturers of motor vehicles, which may contain AI systems that serve as safety components.

Accordingly, it is evident that the AI Act mainly focuses on AI systems integrated into products as safety components. When these are classified as high-risk and are incorporated into products mentioned in Section A of Annex I, manufacturers must adhere to the requirements for high-risk AI systems outlined in the AI Act. Otherwise, if the AI systems are classified as high-risk but are included in devices listed in Annex B, only the obligations under Articles 6 (1), 102-109, and 112 of the AI Act apply (Art. 2.2 AI Act). Notwithstanding the above, in the case of the high-risk AI systems listed in Annex B AI Act, compliance with the legal requirements enforceable under sectoral

legislation is mandatory (Recital 64 AI Act). Thus, the AI Act aims to establish general provisions, without affecting sectoral legislation that imposes additional requirements on those deploying AI systems.

### 3. Continuous learning of the product after being placed on the market or put into service

The continuous learning of a product after it is introduced to the market or put into service is a trait of products with digital elements that include generative AI systems. Art. 7.2.c) PLD refers to this aspect when assessing a product's defectiveness: "the effect on the product of any ability to continue to learn or acquire new features after it is placed on the market or put into service." Although this ability to keep learning or acquiring new features may significantly impact the manufacturer's liability, there are no further references to this aspect in the PLD. Only Recital 32 offers some insight into it.

"The effect on a product's safety of any ability to learn or acquire new features after it is placed on the market or put into service should also be taken into account to reflect the legitimate expectation that a product's software and underlying algorithms are designed in such a way as to prevent hazardous product behaviour. Consequently, a manufacturer that designs a product with the ability to develop unexpected behaviour should remain liable for behaviour that causes harm."

The above recital provides some elements for assessing the potential defectiveness of a product resulting from

continuous learning after it has been placed on the market or put into service, namely, the acquisition of new features and the AI system's ability to avoid hazardous product behaviour. These elements and their impact on the product will be discussed in the following pages. Furthermore, a product which causes damage due to unexpected behaviour will not constitute a circumstance that exonerates the manufacturer of liability.<sup>7</sup> Therefore, a decision made autonomously by the product cannot nullify or lessen the manufacturer's liability, as the product remains under the manufacturer's control and the manufacturer is still liable for any behaviour or decision taken autonomously by the product (Recital 32 PLD).<sup>8</sup>

Therefore, considering the provisions of the text of the PLD, the following premises are set out for further analysing this question:

1. An aspect that must be considered when assessing a product's defectiveness is its capacity for continuous learning, which can manifest in multiple facets, such as the product's ability to acquire new properties and mitigate risks.
2. In general, the appropriate time to assess a product's defectiveness due to its continuous learning ability is when it is placed on the market or put into service. However, since products with digital elements that can be updated or upgraded may remain within the manufacturer's control, it is necessary to consider the moment when the product is no longer within the manufacturer's control.
3. The legitimate expectation of consumers or users should be used as a basis for assessing the self-learning ability of the product to avoid hazardous behaviour and acquire new features or characteristics.

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7. Recital 32 of the Product Liability Directive refers to "unexpected behaviour" as a potential manifestation of harmful conduct resulting from the product's continuous learning. In my view, continuous learning cannot be equated with unexpected behaviour, although the former may indeed give rise to the latter. It is perfectly conceivable that unexpected behaviour may result from a malfunction in the processing or execution of training models or input data available to the product. Nonetheless, the product will have been trained according to behavioural patterns that confer a certain degree of autonomy in its decision-making processes. This autonomy limits the scope of what can be considered truly unexpected behaviour and enables the attribution of liability to the manufacturer. Kim (2023, p. 159). Hartmann, Jueptner, Matalonga, Riordan and White (2023, pp. 35-36).
  8. Atienza Navarro (2025, pp. 17-18). This author contends that the threshold for finding a product defective on account of its learning capability must be assessed by reference to whether that capability delivers a substantial reduction of risk, using as the benchmark the level of risk that would obtain if the relevant action or activity were performed by a human being. Herbosa Martínez (2024, pp. 65-66). Navas Navarro (2022, p.171). For their part, these authors advocate the "reasonable alternative" criterion, meaning that a product will be deemed defective as a consequence of the algorithm's unpredictable behaviour if the manufacturer could have avoided or mitigated it by adopting a reasonable alternative.

### 3.1. Some general considerations

#### 3.1.1. A product that is capable of continuous learning is subject to the manufacturer's control

In the current context, in which digital elements are prevalent in products, it is essential to see a product as something that can change. In other words, a product that causes harm to a third party because it is faulty may not have the same features as when it was first placed on the market or put into service. Conversely, its characteristics may have altered because the manufacturer continues to control the product for safety updates or because it has gained new features. Therefore, the idea of 'manufacturer's control' is very important in evaluating the manufacturer's liability.

This concept is defined in Art. 4.(5) PLD and has undergone significant changes due to the amendments proposed by the Council. Thus, it is seen that the product remains under the manufacturer's control whether the manufacturer itself intervenes or a third party acts with its authorisation to modify the product. In the first case, the manufacturer or an authorised third party acting on its behalf integrates, connects, or supplies a product component or makes a modification to the product. In the second case, the manufacturer or an authorised third party supplies product updates or upgrades, so that in both cases the product changes its properties and remains under the manufacturer's control after being placed on the market; hence, the PLD holds the manufacturer liable for any damage.

Furthermore, it should be noted that, if the damage occurs after a third party's intervention, the third party can attempt to exempt itself from liability if it proves that the damage is unrelated to its intervention (Art. 11.1(f) PLD) or is due to instructions given by the manufacturer. This potential exemption from liability can only be claimed by a third party acting within the manufacturer's control (Art. 8.1(b) PLD). If the third party operates outside the manufacturer's control,

this third party will also be regarded as the manufacturer (Art. 8.2 PLD) for the purpose of attributing liability for damage resulting from its intervention in the product.

#### 3.1.2. Continuous learning and assessment of product defectiveness

Regarding when the defectiveness of a product is assessed, the concept of the manufacturer's control remains crucial in determining liability. Since products with AI systems are constantly evolving, their defectiveness cannot be judged solely based on their condition at the time they were first marketed or put into service. Art. 7.2(e) PLD states that, in such cases, the defectiveness must be evaluated at the moment the product left the manufacturer's control. Therefore, changes to the product's software or AI system that could make it defective should not be judged based on the condition when initially market or put into service, because, among other reasons, the properties of the product have altered.<sup>9</sup> In such cases, the relevant moment is when the product ceased to be under the manufacturer's control.

When the continuous learning of a product is due to the fact that it contains a high-risk AI system, Art. 8.2 AI Act obliges the system provider to comply with the general requirements imposed on high-risk AI systems (Art. 8.1 AI Act). In developing these requirements, Articles 9.2 and 15.1 AI Act state, respectively, that the AI provider must manage the risks of the AI system throughout the product's lifecycle, and that the provider must also ensure its accuracy, robustness and cybersecurity throughout its lifecycle. Accordingly, when high-risk AI that enables continuous learning is embedded in a product and acts as a safety component thereof, it is the manufacturer who must comply with the obligations imposed on providers, meaning that the manufacturer that has equipped its products with such an AI system will be responsible for controlling the risks caused by the continuous learning of

9. Wagner (2023, p. 206). This author states that taking the moment the product leaves the manufacturer's control for the purposes of assessing its defectiveness is only applicable to software (in particular, its security features), and not to hardware, whose defectiveness must be assessed according to its state at the time it was placed on the market or put into service.

the product (Recital 87 AI Act and Art. 25.3 AI Act).<sup>10</sup> However, if the product leaves the manufacturer's control, for instance due to a significant modification carried out by a third party outside their control or acting without their authorisation, then it seems reasonable to say that the original manufacturer can be exempt from liability if the substantial modification has affected the AI system. Conversely, if the substantial modification has not altered the AI system, it is clear that under Art. 9.2 and 15.1 AI Act, the original manufacturer remains liable (Recital 84 AI Act).

The performance of a significant product modification by a third party, through a remanufacturing or refurbishing process outside the control of the original manufacturer and acting without its authorisation, will result in the third party gaining the status of manufacturer (Art. 8.2 PLD). Furthermore, in accordance with Recital 84 AI Act, the economic operator who has carried out the significant modification will be obliged to comply with the obligations imposed by the AI Act, as they will also be regarded as a manufacturer.

### 3.1.3. The 10-year limitation period on the manufacturer's liability: how should it be applied in the case of damage attributable to the continuous learning of the product?

Although products with digital elements that include AI, which can learn, improve and upgrade over time while under the manufacturer's control, are dynamic and changing in nature, the manufacturer's liability for damage caused by the defective product has a static limit over time (Art. 17 PLD). The manufacturer is not liable for damage caused by the product beyond ten years after the moment it is placed on the market or put into service, unless there is a substantial modification to the product. When this occurs, the

product is considered to have been newly introduced onto the market, and the manufacturer's period of liability therefore runs once again from this moment (Art. 17.1(b) PLD).

The expected continuous evolution of the product due to software updates and continuous learning after being placed on the market or put into service is not easily compatible with setting a static limit to the manufacturer's liability, especially as Art. 9.2 and 15.1 AI Act oblige the producer to manage the risks of the AI system during the entire product lifecycle (Navas Navarro, 2022, pp. 93-94).

Art. 17.1 PLD refers to the possibility of restarting the manufacturer's liability in case of significant modifications. Therefore, considering the safety obligations imposed on providers of AI systems throughout the entire product lifecycle by the AI Act, it follows that the 10-year period would hardly apply to damage caused by AI and continuous product learning, unless continuous learning qualifies as a significant modification, in which case the expiry period would restart (Art. 17.1.b) PLD).<sup>11</sup> In any case, the relentless progress of technology means that products become obsolete quickly, so a ten-year limitation period may be sufficiently long to protect both consumers' right to compensation for damage caused by a defective product and manufacturers' interests, by allowing product-liability insurance and the internalisation of innovation costs (Fairgrieve, 2016, p. 96).

### 3.1.4. Product defectiveness and consumer expectations

The defectiveness of a product must be assessed according to the legitimate safety expectations for that product, a criterion that was already adopted by Directive 85/374/

10. Art. 25.3 AI Act therefore determines that the manufacturer of a product shall be considered the supplier of the high-risk AI system and thus subject to the provisions of Art. 16 AI Act, when such system acts as a safety component of the product, and the product is listed in Section A of Annex I, provided that the high-risk AI system is marketed together with the product under the trademark or name of the product manufacturer. However, the situation is different for high-risk AI systems that are integrated into products not listed under Section A of Annex I and which do not act as a safety component. In these cases, the supplier of the high-risk AI system should be subject to compliance with the legal requirements of the AI Act and, therefore, the product manufacturer should not be subject to such compliance, as it would not be considered as the supplier of the AI system. There would be two subjects with different obligations regarding the treatment of the AI incorporated in the product.

Despite the lack of clarity provided by the AI Act in this area, the solution adopted for the purposes of damage caused by defective products fulfils the aim of providing legal certainty to the affected parties: Art. 12 PLD provides for the joint and several liability of all economic operators when they are liable for the same damage (Recital 53 PLD), without prejudice to the provisions of Art. 12.2 PLD.

11. ELI (2023). ELI (2022). The European Law Institute (ELI) proposed introducing a reversal of the burden of proof such that the ten-year limitation period would not apply to damage caused by machine learning if the manufacturer could not prove that the defect was inherent in the product when it was placed on the market or put into service. However, that amendment was not adopted in the PLD.

EEC and which now remains in force with the PLD regulation (Art. 7.1 PLD and Recital 30 PLD) (Stapleton, 1994, p. 234; Borghetti, 2023, p. 33).

At this point, one might question whether the continued learning of a product that includes an AI system could lead the public to reasonably expect potential defectiveness. Recital 30 PLD highlights certain factors that should be considered when assessing the defectiveness of the product in relation to public expectations. From this viewpoint, the public could legitimately expect that continued product learning after deployment might enable the product to perform new functions or enhance its properties or features. In other words, it is an inherent characteristic of such products to adapt to new circumstances and thus serve new purposes or rectify errors in task execution. Consequently, ongoing product learning is a factor that influences the reasonable expectations of the public at large regarding product safety (Recital 32 PLD).<sup>12</sup>

### 3.2. Manifestations of product defectiveness due to continuous learning

#### Correction of errors and performance of functions

At the time of adopting Directive 85/374/EEC, products were regarded as tools fully controlled by humans, used by individuals to satisfy their needs in line with the reasonably expected use of such products (Art. 6(1)(b) of Directive 85/374/EEC). Even when products included software, that software was typically embedded, preprogrammed, and operated strictly in accordance with the user's instructions. In contrast, today's technological environment is characterized by the evolution of product software towards greater autonomy. Software now embedded in products may no longer follow a fixed, predetermined sequence of commands, but can instead make autonomous decisions. This shift is driven by the advent of continuous learning - the capacity of products to modify their functioning through experience after being placed on the market or put into service - and by the wider development of artificial intelligence systems.

Continuous learning is the process by which a product can acquire new characteristics or perform new tasks through continuous exposure to a large amount of data (Huberman, 2021, p. 109). As the product interacts with more data and is trained, its algorithm can improve its performance to better fulfil its functions (Vallor & Bekey, 2017, p. 340). The learning ability of products that include AI enables them to operate with partial independence from the instructions set by their programmers. The increasing autonomy of these products is therefore due to the algorithm's capacity to detect statistical patterns in the data it analyses and to automatically build models without manual programming (Surden, 2014, pp. 89-95). Despite the growing autonomy of the product, the software must initially be programmed to perform certain functions when it is launched or put into service, although its learning ability later allows it to adopt new solutions. However, the data, decisions made by the product, and its evolving characteristics as a result of its learning capacity will influence its potential for defectiveness. In this regard, legal doctrine has contributed several insights concerning defective continuous learning (Cormen, 2013, pp. 2-4):

- a) The inaccuracy of the data that feeds the machine learning system on which the algorithm relies. In this case, the system has not been provided with up-to-date data and has therefore made an incorrect decision due to the use of outdated data or parameters.
- b) Error of the algorithm concerning the decision made, meaning the algorithm fails to follow the instructions provided by the user when there are multiple possible procedures. For example, a GPS navigation system where the user wants to choose the fastest route. If the system ignores certain information about the current traffic conditions, the route selected may not be the quickest, as there could be other options.
- c) Defective execution of new functions. The idea that products with embedded AI are completely hard-coded to perform their functions must be discarded. These products are, or should be, capable of performing new func-

12. Pazos Castro (2025, p. 6). The author considers that the continuous and rapid evolution of technology may prove problematic for the purposes of assessing consumers' legitimate safety expectations. Some users may have formed reasonable expectations in line with the earlier state of the art and, therefore, their expectations will be more than met if the product is capable of learning after deployment. By contrast, other consumers may hold higher expectations and feel unprotected if the product is unable to integrate new functionalities. In such a case, the product should not be deemed defective where economic operators have not incorporated the legitimate expectations of the public at large.

tions that, at the time they are placed on the market or put into service, are still unknown, or of making decisions according to an unprogrammed data pattern. In this case, the product is not ready to perform its functions from the outset; however, it can learn to do so if permitted by the algorithm and machine learning (Desai & Kroll, 2017, pp. 26-27). In other words, the product must continuously learn to perform new functions by analysing available data and developing new patterns. In this case, the continuous learning process is governed by the AI provider's data and methods, meaning that the product's performance is not fully autonomous (Art. 10 AI Act). In other words, regardless of the source of the data on which the product's continuous learning is based (be it the user, the provider or the deployer), Art. 16 AI Act, in conjunction with Art. 10 AI Act, imposes on the provider of the high-risk AI system a duty to govern the system's data. Therefore, as mentioned above, if there is a duty to govern the data of the high-risk AI system, the AI provider will be able control the data that feeds the continuous product learning.

The above groups make it possible, albeit schematically, to outline the possible defects that a product may have that affect its continuous learning capacity. In all of them, the AI manufacturer or provider can exercise control, in the sense of correcting any errors in the system's data, improving the algorithm's decision-making process or preparing the product so that it can acquire new features. Therefore, the PLD's premise of concentrating liability on the manufacturer for damages caused by defective products remains appropriate (Recital 32 PLD).

The main beneficiary of the joint and several liability of economic operators outlined in Art. 12 PLD is the user, because the product is presented as a complete entity, including hardware and software. This means the user does not need to prove which economic operator is responsible for the damage. Consequently, both the manufacturer and the AI provider would be held jointly and severally liable for any harm caused by the product due to defective continuous learning.

## Conclusions

**First:** continuous learning of the product must be understood as referring to products incorporating generative artificial intelligence, which enables the product to alter its properties and acquire new characteristics after being

placed on the market or put into service. By contrast, products equipped with non-generative artificial intelligence are not capable of modifying their characteristics after being placed on the market, which brings them closer to pre-programmed, deterministic software.

**Second:** the PLD has elevated software, applications, and AI systems to the status of products (Recital 13 PLD). This reform is undoubtedly welcome, as it puts an end to the ambiguity surrounding the definition of "product" under Directive 85/374/EEC, which previously did not include intangible items. Despite their classification as products, AI systems will generally function as a related service or component of another product, to which they are added or with which they are interconnected, such that, without the AI system, the product could not perform its functions or would fail to deliver the safety level expected by the public (Recital 17 PLD). However, their integration or interconnection with a tangible product may result in liability being attributed to the manufacturer, especially if the AI system either enables the product to perform its functions or compromises its safety, regardless of how it is supplied, thereby acting as a related service or component.

**Third:** one characteristic of products with digital elements with embedded generative AI is that, when they are released to the market or put into service, the manufacturer continues to exercise control over the product. This control allows for periodic updates to fix software errors, add new features, or enhance security. Understanding the concept of the manufacturer's control is essential for grasping manufacturer liability related to continuous product learning. Therefore, since products with generative AI remain under the manufacturer's control, the product's defectiveness must be assessed once it is no longer under the manufacturer's control.

**Fourth:** continuous product learning is also a factor influencing the duration of the manufacturer's liability. Art. 17.1 PLD states that the manufacturer's liability lasts for ten years after the product is placed on the market or put into service. However, the ten-year liability period specified in Art. 17.1 PLD does not suit products with generative AI that remain under the manufacturer's control after being marketed or deployed, and which are regularly updated and capable of learning after deployment. Therefore, it is proposed to interpret Art. 17.1 PLD together with Art. 7.2.e) PLD so that the manufacturer's liability begins when the product leaves the manufacturer's control. Otherwise,

even though the AI Act requires providers to monitor AI systems throughout their entire lifecycle, the manufacturer's liability for damage caused by AI products would be limited to ten years from market placement or deployment, ignoring the fact that the product might develop defects from continuous learning beyond that period.

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