European Office

Artificial Intelligence in industry - the road to a European success

Statement of the VDMA on the White Paper of the EU Commission (COM (2020) 65 final)

June 2020

VDMA core messages:

- Artificial intelligence can become a European success story. This requires an objective approach which respects key values, but which is inspired by opportunities. From the VDMA's point of view, the EU Commission's White Paper is a very good start. However, the VDMA sees the necessity to discuss the risks and opportunities of the industrial use of artificial intelligence in a more differentiated manner.
- For the European mechanical engineering industry and its customers, AI is an opportunity to maintain global product leadership and master challenges such as resource scarcity and climate change. However, the enormous potential of industrial AI can only be tapped if AI is used on a broad industrial scale. This requires a holistic view of algorithms, data and application context.
- The VDMA fully supports the fact that the EU Commission wants to shape AI and the exchange of data at European level. A patchwork of national rules must be avoided at all costs. However, the international level must also be kept in mind to avoid competitive disadvantages of European companies on world markets.
- In the view of the VDMA, a new, horizontal regulation for AI technologies is currently not justified. The White Paper does not provide evidence of any fundamental regulatory gaps. Instead, it should be observed and examined whether the existing regulation has gaps and where it needs to be improved. The legislator should not regulate technologies, but should instead target the effects of AI application. Otherwise, there is a risk of hampering innovation and having to constantly create new laws for adapting to technological progress.
- Should horizontal legislation be considered necessary in the future, the right approach would be a limitation to high risk applications. AI must not be placed under general suspicion. Instead, there must be room for the many harmless and promising AI applications. It is therefore essential to develop a clear methodology to identify "high risk applications" and to define the scope of eventual legislation.
- At present, products and machines are hardly affected by the specific characteristics of AI (opacity, unpredictability and autonomous behaviour) as listed in the White Paper. A precise analysis of the actual autonomy and learning capacity is a prerequisite for assessing the risk and the need for legislation.
- In the view of the VDMA, the safety concerns expressed in the White Paper do not apply to mechanical engineering and industrial production. The safety requirements are formulated in a technology-neutral manner and also apply to machines with AI elements. Factories with AI are just as safe as without AI, since all requirements must be met in the same way as now.
- Currently, the VDMA does not consider a readjustment of the product liability regulations to be necessary. Further analysis, observation and examination are necessary before a proven liability regime is changed. A distinction should be made between products with embedded AI and pure AI software as they differ fundamentally in the area of safety legislation.
- The VDMA calls for a focus on informed users and markets instead of regulation. In principle, ex-ante requirements should be avoided wherever possible. Instead, analysis, monitoring and information should be the basis for further decisions.

1. Introduction: Artificial intelligence is an opportunity for Europe’s companies

Mechanical engineering companies are the central multiplier for the application of artificial intelligence in industrial production. Their machines, plants and engineering services use AI technologies and thus bring new solutions to a multitude of customers, factories and industries. Mechanical engineering builds on its experience with efficient technology integration and responsible design of human-machine cooperation - for example in robotics, automation technology or sensor technology.

For the mechanical engineering industry, AI is an opportunity to maintain its global product leadership. AI helps to increase efficiency, develop new business models and improve the quality and safety of products. Production processes can be optimized and machines are enhanced with intelligent functions by AI elements. If these opportunities are not successfully exploited, the leading role of European mechanical engineering will be lost to competitors from other technology regions, such as the United States and China. However, the integration of AI technologies is not only a competitive advantage. It also enables us to use materials and energy more efficiently, make better decisions and thus overcome challenges such as resource scarcity and climate change. The integration of AI in mechanical engineering is therefore an absolute must for companies, research and politics.

Like any technology, artificial intelligence also involves risks. From the point of view of the VDMA, however, artificial intelligence is not a new, independent challenge, but is covered by "classic" fields of action such as product and machine safety, the design of the working world and standardization. For example, even machines in which AI is used are already subject to the legal requirements for product safety and EU harmonisation legislation.

The VDMA is convinced that AI can become a European success story - for consumers, companies and the environment. However, this requires an objective approach that respects key values, but is primarily inspired by opportunities. From the perspective of the VDMA, the EU Commission has made a good start with the White Paper. However, the VDMA sees the necessity to discuss the aspects of the use of artificial intelligence in industry in a more differentiated manner and to evaluate the risks differently.

2. Artificial intelligence in industry: many opportunities, few risks

2.1 State of the art of industrial AI use

"Machine Learning" as a form of "narrow" AI is already a reality in mechanical engineering and is used to answer specific technological or economic questions. However, the development is still in its infancy and the potential is enormous: The breadth and variety of industrial applications promise more productivity and new solutions; not only for a few pioneers, but for the whole range of companies. Especially the combination of AI with the strengths of European industry is a competitive advantage for Europe.

Examples of industrial application of AI:

- Quality assurance with image processing methods to check surfaces or textures. AI has great potential to make existing and proven image processing even more powerful.

- Process optimization of complex machines and systems: Here, sensor-based machine learning can provide information on how to shorten start-up times or to discover unknown sources of error or potential for improvement.
- AI as a "virtual digital assistant" that helps to monitor the system or solve problems, for example by detecting faults.
- "Predictive Maintenance", the evaluation of data with the aim of making maintenance and repair processes more efficient and predicting failures.
- Optimization of internal production structures and processes, for example in production planning or procurement by evaluating ERP data
- "Smart product development": Improvement of development and product management, for example when products provide data during the use phase and thus provide indications for innovations and improvements.
- In sales and planning, AI tools for the intelligent configuration of complex systems can open up considerable business value potential.

Issues such as the "black box" effect or the consequences of "self-learning systems" are also being discussed in industry, where trust in the reliability and safety of the technology are also indispensable to create acceptance among people, companies and the public. AI will have effects on the cooperation between humans and machines as well as on the cooperation in industrial ecosystems, which have to be considered. The rights and interests of employees, customers and investors must be protected.

However, the above-mentioned examples also show that the assessment of the opportunities and risks of industrial use must differ in some aspects from the situation in Business2Consumers (B2C) or Government2Citizens.

2.2 Specifics of AI use in industry

- AI is mostly used as an analytical tool and under human supervision: AI technologies are mainly used for analysis and development purposes by operators, engineers and developers without a direct link to the operational implementation. Examples are the optimization of product development or the identification of potential solutions. Human supervision is therefore guaranteed.
- AI is part of the system function: When AI is used operationally in business and production processes, it is an element of a system that supports predefined functions. AI is not the determining factor for system behaviour. The high demands on industrial processes in terms of quality, safety and repeatability limit the autonomy.
- Extensive existing regulation: Industrial environments have always used automated physical processes that may pose a safety risk. However, this is completely independent of the use of AI and is already covered by safety laws and standards. Every manufacturer - with or without AI - must perform a safety compliance assessment for the intended use.
- Limited scalability: AI's applications in industrial production are application-specific and linked to physical processes, making rapid scalability difficult. The rapid spread of risky or ethically questionable solutions as in B2C Internet applications is not possible. Furthermore, rapid success or "killer applications" should not be expected - AI development in industry is sometimes lengthy and involves a lot of effort.

- In industry, too, there is a need to consciously deal with conflicts of interest that would have remained non-transparent or unregulated without the use of AI, for example when AI is used in planning and operational processes in procurement, production and logistics. Although the spectrum of opportunities and risks here is not as scalable as with B2C Internet applications, the lack of embedding in physical processes may well mean that there are similarities with B2C and the need to redesign relationships between companies or internal company processes.
- Customer relations are B2B and are defined by contractual agreements. Therefore, there is usually no special need for protection of AI users.
- In manufacturing processes, AI is a quality assurance tool that is used by people: AI technologies are mainly used for automated quality assurance purposes, or to support human decisions. Therefore, human supervision is also guaranteed.

3. "Ecosystem of Excellence": aiming for broad use in all companies

In order to exploit European strengths and unlock the potential of AI for competitiveness and efficiency, AI must first and foremost be translated into concrete applications in industry. This not only concerns the development of algorithms, but also their selection and adaptation as well as the context-dependent collection, selection and quality assurance of data. Promising applications ensure fast diffusion and effective leverage effects, such as industrial production, the use of AI in development, construction or new business models.

AI can only become a European success story if it succeeds in bringing technology to the breadth of SMEs and industrial SMEs. It is therefore important to ensure efficient technology transfer and to provide low-threshold access to technologies, projects, expertise and networks. Test and competence centres in which processes and business models are tested can be very useful for this - provided they are located in an industrial environment and offer practice-oriented formats.

VDMA Position

AI must be brought into broad industrial application. A holistic view of algorithms, data and the application context is important. The measures proposed by the Commission, such as the initiatives on data exchange (e.g. a "Manufacturing Data Space") and the focus on SMEs point in the right direction, but must be shaped in a practical and industry-oriented way.

AI is an interdisciplinary field that requires intensive cooperation between data/AI experts and other disciplines. Priority should therefore be given to interdisciplinary approaches that promote cooperation.

It is also important to make the necessary expertise available to companies in the most productive form and to counter the shortage of skilled workers with efficient solutions. Not every company will be able to employ data and AI experts. Concepts such as "AI self-service" or "guided analytics" can help to make it easier for business experts in companies to use AI without having to be AI experts themselves. It is important to enable companies to define requirements and evaluate solutions together with AI experts or with the help of suitable decision-supporting AI tools.

VDMA Position

The VDMA supports the concept presented in the White Paper, to not only address AI competencies in academic education, but also to focus on general and vocational education and training as well as further education. It is important to enable companies to use AI through expertise and AI tools.

4. "An ecosystem of trust": Not AI, but the application is crucial

4.1 The future of AI is a task for Europe with a global dimension

The EU internal market plays a central role for the future of AI: only in a harmonised market with cross-border rules and initiatives can the necessary economies of scale be achieved and the framework conditions for investment be created. A patchwork of national initiatives or even national legislation should be avoided. At the same time, care must be taken to ensure that European rules remain globally compatible and that European companies are not disadvantaged.

VDMA Position

The VDMA expressly supports the fact that the EU Commission wants to shape AI and the exchange of data at the European level. A patchwork, including possible exemption clauses at national level, must be avoided. At the same time the international level must be kept in mind to avoid creating a disadvantage for European companies.

4.2 The need for new legislation on AI has not yet been demonstrated

Artificial intelligence is a generic term for a range of technologies that can be used in a wide variety of applications. These applications can be risky, but in most cases they are already subject to legal regulations. In the view of the VDMA, the Commission's White Paper does not identify any fundamental gaps in the regulation of artificial intelligence that would justify additional legislation. Rather, there is a risk that new legal uncertainties and consistency problems will be raised.

In the view of the VDMA, it should be carefully examined whether the effects of artificial intelligence and new technologies are not already sufficiently covered by existing legislation and whether, as stated in the White Paper, "the existing legislation is equal to the AI risks and can be effectively enforced. "To speed up this process, regulatory "sandboxes" could be used. If gaps are identified, they should be filled as far as possible by adapting existing legislation. Only if all this is not sufficient, new legislation should be considered.

VDMA Position

In the view of the VDMA, a new, horizontal regulation for AI technologies is currently not justified. The White Paper does not identify fundamental regulatory gaps. Instead, the effects of new technologies in respective applications and existing regulation should be examined. If it has been proven that deficits exist which cannot be eliminated by adapting existing laws, new laws should be considered.

4.3 Focus on the risks of the application, do not regulate technologies!

Despite the economic opportunities and the number of new questions raised: AI does not create a new class of machines and production systems. Machines are still designed by humans for a defined function and in compliance with safety regulations. Moreover, many industrial AI applications are exclusively technical in nature and do not raise ethical or legal questions.

VDMA Position

The legislator should not regulate the technology, but must take into account the effects in the application. Otherwise there is a danger of unnecessarily impeding technological progress and having to constantly enact new laws. Should horizontal legislation be considered necessary in the future, the right approach is limiting it to high-risk applications. AI must not be placed under general suspicion, but there must be scope for the many harmless and promising AI applications.

4.4 Formulate requirements for trustworthy AI specifically for the application

Provided that the scope is defined in a meaningful and proportionate way, the listing of requirements in the White Paper seems appropriate. For example, information on the limitations and capabilities of AI can help to build expertise in dealing with AI, avoid misunderstandings and increase acceptance. However, a trade-off has to be made, for example whether transparency obligations jeopardise the protection of business secrets or intellectual property.

VDMA Position

The requirements listed in the White Paper are useful, provided the scope and risk are correctly and clearly defined. Trade-offs, such as the balance between protection of trade secrets and transparency, must be addressed.

4.5 Create legal certainty through clear criteria for the scope

The VDMA supports the White Paper's objective of ensuring proportionality and not making the legal framework excessively prescriptive. The basic approach of linking risk assessment to application is also appropriate. This ensures that regulation is technology-neutral and remains focused. This approach should be pursued further.

Nevertheless, there is a risk that unclear criteria could create legal uncertainty. It is therefore essential to develop a clear methodology to clearly define so-called "high risk applications". It is also necessary to find a simple and legally secure definition of when a system is considered to be an "AI" and which behaviour is to be classified as "autonomous" and "intelligent". The current state of the discussion on this question does not yet provide a sufficient basis for legal regulations. Failure to create this basis could lead to years of uncertainty and ultimately to a setback in the use of AI.

VDMA Position

It will be crucial for good legislation that its scope is clear and that the criteria are easy and quick to interpret. It is therefore essential to develop a clear methodology to define so-called "high risk applications". The approach of focusing on critical applications is correct. It must also be clarified when an application is considered to be an “AI” and who decides this. An orientation phase lasting for years, as is has been the case of GDPR, must be avoided.

4.6 Check existing laws objectively for suitability

AI is already covered by a large number of laws. However, AI can raise questions about the suitability of existing regulations and an audit is useful. This examination must be based on a realistic assessment of the possibilities and effects of AI. The VDMA considers the need to adapt existing legislation in industry to be minimal, since the relevant regulations are formulated in a technology-neutral manner and the use of AI does not lead to a completely new type of product behaviour.

VDMA Position

Whether an adaptation of existing legislation is necessary must be carefully examined in the context of its application. This examination must take place in the context of application and be based on the reality of the use of AI.

4.7 Assess the real impact of AI and the autonomy of systems

It is true that AI technologies will enable higher degrees of autonomy of products or systems in the future. The White Paper and the "Report on the safety and liability implications of Artificial Intelligence, the Internet of Things and robotics" describe these possibilities in principle correctly, but ignore the actual limitations of autonomy. This gives the false impression that in the near future there will be a class of physical products with autonomous functions controlled by AI.

From the perspective of the VDMA this is currently not the case, as the behaviour of the products follows the deterministic functionalities specified by the developer. AI elements are only building blocks of the overall system. The autonomous behaviour is defined before placing on the market and only takes place within narrow system limits specified by the manufacturer and the legislator. Moreover, an extension of autonomy does not take place in a void, but within the framework of advances in automation technology, which are embedded in a context of standardization, methods, business models and in the dialogue between the social partners.

It is true that AI and Industry 4.0 as a whole will lead to a situation where products are increasingly able to experience software-based updates or configuration changes during the usage phase and where operational functions are increasingly be determined by data. How conformity can be assessed and proven in these cases is an important question, but it cannot be answered prematurely and certainly not by the legislator alone. Priority must be given to the development of classifications, taxonomies and methods that enable agile or even automatable risk assessment and validation. However, new legislation is not necessary at present, and could even lead to uncertainty.

The White Paper mentions opacity as another AI problem It is true that the results of artificial intelligence do not always provide deterministic predictions. Transparency requirements in the form of comprehensible rules in the narrower sense are therefore hard to meet. However, the concern about this characteristic of AI ignores two points: Firstly, the behaviour of non-AI systems is not always fully comprehensible either (whether due to a lack of models or disproportionate effort) and secondly, possible residual risks are already being addressed in the risk assessment of technical systems. In most cases, safety and acceptance is not achieved through complete traceability, but through tests, experiments, checks and impact assessments. These challenges are not new for the safety and liability framework.

In applications where a consistent, rule-based traceability is required, certain AI procedures and their advantages might have to be omitted. To systematically counteract such limitations, the question of explainability should not only be related to the processes in the AI algorithms themselves. Instead,it should be investigated how the input into an AI system can be designed to avoid undesired behaviour. Explainability guidelines could help to influence the behaviour of AI systems on the provider and user side.

If artificial intelligence is used in applications that are not limited by safety requirements or physical functionality - for example in planning or procurement processes - a discussion is needed on how the properties of AI change the cooperation between humans and machines and in ecosystems. However, this does not currently justify any need for action by the legislator.

VDMA Position

At present, products and machines are only affected by the specific characteristics of AI (opacity, unpredictability and autonomous behaviour) listed in the White Paper to a limited extent. A precise analysis of the actual autonomy and learning capacity is a prerequisite for assessing the risk and the need for legislation.

4.8 Machines are safe even when using AI due to existing laws

As described, even when using artificial intelligence, the degree of autonomy is limited - by the functionality and the limits defined by the developer[1]. In the case of physical products, these limits are also set by the safety concepts of the manufacturer. The public law regulations on product safety cover all functions of a product that operate within the limits defined by the manufacturer. AI can only operate within these limits.

Furthermore, the health and safety regulations applicable to machinery are not undermined by AI because they are formulated as technology-neutral protection objectives. There is a legal obligation to apply the state of the art (documented in harmonized standards) in order to fulfil these protection goals. Functions of the machine that are influenced, modified or even generated by AI must be taken into account by the manufacturer during the conformity assessment procedure and must be recorded in their

[1] Platform Industry 4.0: "Autonomy always takes place within system boundaries set by humans. The human being defines for which overall system a certain degree of autonomy is to be achieved, as well as within which areas and for which functions AI is allowed to work. The degree of autonomy of a system is not necessarily only subject to technical limitations of AI, but is also influenced by other aspects such as legal framework conditions, estimation of the advantages and disadvantages of human actions or requirements regarding data security. „TECHNOLOGIESZENARIO „KÜNSTLICHE INTELLIGENZ IN DER INDUSTRIE“,2019, S.20, https://www.plattform-i40.de/PI40/Redaktion/DE/Downloads/Publikation/KI-industrie-40.pdf?__blob=publicationFile=10

entirety. An AI machine must also not enter an uncontrolled state that would pose a danger to the operator or uninvolved third parties.

Even the utilization of self-learning procedures during use - for example, when using "reinforcement learning" procedures - does not cancel out the safety regulations: The degrees of freedom of the AI can, for example, be limited by independent external monitoring of the critical system parameters in such a way that conformity is guaranteed. If this safety concept is abandoned by the results of the learning, a re-evaluation is necessary.

The Machinery Directive also covers this scenario of AI-induced change. The existing CE regulations on product safety define the essential requirements for product safety, which must be complied with when the product is placed on the market. These requirements are formulated in a technology-neutral manner and are concretized by current standards. This ensures that the product corresponds to the state of the art - without having to adapt the legislation itself. Significant changes during the use phase - for example a new function of a machine due to modification - are also covered by the safety legislation. In this case, the product is classified as new and a new assessment of conformity is required. A digital change to the characteristics of a machine - for example through a software update - is in principle no different from the conversion of a non-digital product; it is a "digital" conversion, so to speak. The already existing concept of "substantial change" can therefore also be applied to digitised products. Whether or not this digital change is based on an AI procedure is irrelevant. The currently prescribed conformity assessment procedures are suitable for this.

At the level of checking whether a modified product complies with the standards and how validation is carried out, there may of course be changes and adaptations to the state of the art. However, this progress is in turn updated in the standards of testing technology and is not subject to legislation. Instead, the state of the art must be developed further and there is a need for action in research, development and standardization. It is not necessary to change the legislation and the essential requirements; on the contrary, it would question the current clear and proven orientation.

VDMA Position

The VDMA sees no need for action by the legislator on the subject of machine safety. State of the art of testing technology, standards and validation methods must be further developed, but at the legislative level - such as the EU Machinery Directive - the safety requirements are formulated in a technology-neutral manner and also apply to machines with AI elements. Factories with AI are therefore just as safe as without AI, as all safety requirements must be fulfilled in the same way.

4.9 Liability

In principle, the current Product Liability Directive and national liability regimes provide a legal framework within which AI problems can be solved. The Product Liability Directive is formulated in a technology-neutral way and the courts have applied it over the years to a wide range of products, many of which did not exist when the Directive was adopted in 1985. This legal framework for liability claims applies both to damage caused by a defective conventional product and to damage caused by a robot or other automated system.

The White Paper sees some need for action on the adaptation of the liability framework, justifying it with specific characteristics of new digital technologies such as autonomous behaviour, self-learning, data dependency and opacity.

From the point of view of the VDMA, the questions raised in the White Paper are important and must be answered. However, this does not yet justify an immediate need for a fundamental readjustment of the liability framework. Due to the complexity of the issue, further analyses, debates and observations of the real developments remain necessary. When deciding on new regulations, the far-reaching effects on the innovation system in Europe must also be taken into account.

The VDMA therefore recommends that sufficient time should be set aside for monitoring and testing the effects of artificial intelligence. For example, regulatory sandboxes could contribute not only to technically validating AI, but also to specifically investigating the concrete effects of AI characteristics on legal issues. In particular, the current regulations in the EU Member States must be analysed in detail to determine whether or not there are in fact liability gaps and problems of proof.

In the VDMA's view, two considerations are essential in order to conduct the debate on liability issues in a constructive and objective manner: Firstly, a distinction must be made between two areas: On the one hand, embedded AI, which is covered by the product term and is the subject of safety legislation, and on the other hand AI as a pure software application. Secondly, it is absolutely necessary to develop definitions and methodologies in order to transform terms like "autonomy", "AI systems" and "AI risks" into manageable and transparent concepts.

In the field of embedded AI, the possibilities of the existing Product Liability Directive should be carefully examined. Especially in combination with safety legislation, the Product Liability Directive already offers suitable instruments to also cover properties of products with AI elements. The Product Liability Directive already provides for liability without fault:: According to the Product Liability Directive, a product is deemed to be defective if it does not offer the safety that one could legitimately expect, taking all circumstances into account. This is regularly the case if it does not comply with the relevant safety regulations. Another example is the concept of "substantial change", which provides an approach on how to deal with software updates and AI-induced changes that occur after the product is placed on the market. In many places it may be sufficient to adapt guidelines and information requirements.

There should not be an insurance obligation, as current practice shows that producers regularly take out voluntary insurance when they are liable.

VDMA Position

The VDMA does not consider a readjustment of the liability rules to be necessary at the present time. Further analysis, observation and examination are necessary before a proven liability regime is changed. A distinction should be made between products with embedded AI (and thus covered by safety legislation) and AI software.

4.10 Focus on informed users and functioning markets

The White Paper gives the impression that users and consumers of AI are defenceless against developments. Especially in the B2B context, however, it can be assumed that badly made or unethical AI will not prevail on the market. Even at present, compliance

and conformity requirements, quality standards as well as the added value for the customer all act as selection criteria.

On the other hand, detailed regulation or the use of certification can drive up costs and prevent innovation. Particularly for SMEs that are active in specific and less rapidly scalable fields of application (such as mechanical engineering), prohibitive hurdles are thus quickly reached and prevent the use of AI.

The discussion on artificial intelligence will therefore be an occasion for the legislator to recall the principle of subsidiarity and technological neutrality and to only intervene directly in market processes if solutions cannot be achieved by those directly involved.

VDMA Position

The VDMA calls for a focus on informed users and markets rather than regulation. As a matter of principle, ex-ante requirements should be avoided wherever possible. Instead, analysis, monitoring and information should be the basis for further decisions.

Contacts VDMA:

Kai Peters
VDMA European Office
kai.peters@vdma.org
+32 2 7068219

Guido Reimann
VDMA Software und Digitalisierung
guido.reimann@vdma.org
+49 69 66 0312 58