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# Review And Importance of International Legal Dimensions of The Use of Artificial Intelligence in Space Technologies

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With the remarkable developments in space technologies, artificial intelligence has gradually been used instead of humans in decision-making. Artificial intelligence has the ability to think logically, manage its own actions, and correct decisions in the event of changes in external conditions. New smart space technologies are being developed to perform various space activities such as processing space data and information, removing space debris, extracting natural space resources, and exploring without human intervention. However, the regulation of the activities of space actors, especially private actors, and the supervision of these activities by governments in the use of these types of technologies has become one of the new issues in the field of international space law.

Since the obligations of States within the framework of international space law are explained on the basis of human behavior, in the face of monitoring the performance of intelligent space technologies and compensation for damage resulting from their performance, the question arises as to whether the existing international space regulations on the international responsibility of States for monitoring space activities and compensation for damage, which are based on human behavior, can also be applied to the use of these technologies, or should the regulations be A new space law should be drafted. With a broad interpretation of Articles 6 and 7 of the 1967 Outer Space Treaty regarding the responsibility of States for monitoring space activities and also the responsibility for compensation for damage, these provisions can still be considered applicable.

Nevertheless, it seems that the development of new international space regulations could be an important step in better defining and recognizing the responsibility of states to monitor the use of intelligent space technologies by space actors and to compensate for damages resulting from it.

***Keywords**: International Law, Artificial İntelligence, Space Technology, Liability.*

## INTRODUCTION

Artificial intelligence is a computer system that operates to some extent similar to the human mind and includes cognitive technology that imitates the human mind. To the extent that artificial intelligence can make decisions for humans, the role of the human agent becomes less important. Therefore, with the development of the use of artificial intelligence in new technologies, including space technologies, human intervention in decision-making has gradually decreased and artificial intelligence has gained the ability to make decisions instead of humans in various situations. (Abashidze et al., 2022, p. 1).

Since the beginning of space activities, from the 1960s until now, the use of space technologies such as spacecraft and satellites or the use of space robots in the extraction of natural resources from celestial bodies has usually been carried out by astronauts who have human intelligence and behavior. However, in recent years, there have been remarkable developments in space technologies, especially satellite systems and space-based services, in which artificial intelligence is used to make decisions instead of humans. Since the nature of spacecraft provides a suitable platform for the development of artificial intelligence, and almost all space activities such as remote sensing and remote communications have the ability to use artificial

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intelligence, modern intelligent space technologies are currently being used for space debris removal, natural resource extraction in space, and exploration.

By using these technologies, better services in various fields, including transportation, smart city management, ensuring national and cyber security, agricultural services, and monitoring climate change, are provided to the public.

Despite the benefits of using artificial intelligence in space technologies, with the expansion of intelligent space-based services, new challenges have emerged in the field of space activities. The use of technologies equipped with artificial intelligence, for the purpose of exploring outer space and also participating in commercial space applications and services, will create unintended consequences regarding the obligations and responsibilities of States.

These consequences arise from the correct or incorrect use of such technologies and cannot be ignored. It is possible that due to inefficiency in the functioning of artificial intelligence, which makes decisions independently of humans, damage to life and property of people on Earth or in space could occur. Also, the use of space-based applications equipped with artificial intelligence increases the possibility that the rights related to the privacy of individuals will be violated or the security of citizens will be jeopardized.

With the increase in the volume of data, spatial information and its processing through artificial intelligence, a lot of information is becoming widely available to the public. Among this information and data, confidential( or private information of real and legal people may also be disclosed without their consent. (Martin & Freeland, 2020 : 278 )

Whereas the issue of State oversight of space activities and compensation for damage is clarified in international space law and the responsibility to prevent the commission of an internationally wrongful act under Article 6 and the responsibility to compensate for damage under Article 7 of the Convention on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Activities of 1967 (the Outer Space Treaty) requires a connection between the oversight and the damage. and damages caused by human behavior have been proven, the question arises whether the responsibility for monitoring the activities of space actors, including private actors, can be specified and determined based on these regulations, while human behavior will be reduced or completely ineffective with artificial intelligence decision-making.

In this article, current international space law and the possibility of applying international regulations to the challenges posed by the use of artificial intelligence in determining the responsibility of states for Supervision and compensation will be considered.

With a broad interpretation of these articles, with regard to the competent State, responsibilities for space activities in space technologies that use artificial intelligence can also be determined for States. Also, clarifying the responsibility of contracting states in the use of space technologies, which use artificial intelligence, in treaty law could be an important step in international space law.

## INTERNATIONAL SPACE LAW APPROACH USING ARTIFICIAL INTELLIGENCE

In general, the development of artificial intelligence in space technologies currently faces a lack of enforceable international regulations and has not yet been explicitly and directly addressed within the framework of space “hard law” and “soft law.” Space “soft law,” which has played a significant role in regulating space activities in recent years, has not provided regulations or guidelines for dealing with states regarding liability for the use of artificial intelligence in space technologies. Although in 2018, issues related to the use of artificial intelligence technologies in space were raised as part of the activities of the Committee

on the Peaceful Uses of Outer Space (COPOS), and the topic of the work order for this year was specifically the use of artificial intelligence for processing satellite images, the examination of this issue was removed from the work order of this Committee without any concrete results or legal achievements. Since then, the topic of artificial intelligence has not been included as a separate and independent topic in the COPUS agenda (Report of the Committee on the Peaceful Uses of Outer Space, 2018).

Space activities are governed by the "hard law" of space, which has already been adopted by the United Nations in the framework of five international treaties. Of these five treaties, four are international space treaties, namely the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 1967 (Outer Space Treaty), the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Abandoned in Outer Space, 1968, and the Convention on International Liability for Damage Caused by Space Objects, 1972 (Liability Convention (1972) and The Convention on Registration of Objects Launched into Outer Space, 1974 (Registration Convention, 1974) have been implemented, and the fifth treaty, the Agreement Governing the Activities of States on the Moon (and Other Celestial Bodies, 1978), has not yet been implemented, despite the passage of more than 45 years since its ratification. (Masson-Zwaan & Mahulena, 2019: 32) .

These five treaties contain explicit provisions on the use of artificial intelligence technologies. They are not binding and only state general principles for all space activities. In general, these general principles and rules mainly concern the following:

(1) The exploration and use of outer space shall be for the benefit of all States.

(2) Space shall not be subject to the national occupation and possession of any State, and space activities shall be conducted in accordance with international law.

(3) Space activities should be conducted based on the principle of cooperation and the obligation to take into account the interests of other States in this regard.

(4) States should inform the public and the scientific community of the nature, course, locations and results of their space activities.

(5) States are responsible for all national activities in the international arena and towards other States and, in the event of damage, must make reparation for the damage.

Among the aforementioned principles, since the principle of responsibility In the absence of explicit and transparent provisions on AI issues in space technologies, especially in the area of liability, it can be argued that the starting point of the legal challenge should be the use of AI to align the rules and principles of liability with the performance of AI.

The use of AI systems in space activities will cause gradual changes in human analysis and selection. With the help of computers and computer-assisted selection, humans have become capable of analyzing and analyzing information and automating machines without the need for human performance and making decisions and implementing them independently by artificial intelligence. (Cuellar, 2017: 30)

## CHALLENGES OF INTERNATIONAL SPACE RESPONSIBILITY

The deployment and use of artificially intelligent space objects by new space actors in space has raised the issue of how to assign international responsibility to contracting states; Because the principles of liability in these treaties on issues such as surveillance of space activities, compensation for damage to property and persons, and ultimately the disclosure of data and information of individuals and the violation of their privacy in space activities based on human-centered behavior, their application to behavior based on

artificial intelligence requires new examination (Stewart, 2019: 2). To respond to this new challenge, it is necessary to first examine existing international space law. It should also be clarified whether existing international rules on liability are also applicable to the consequences of the use of artificial intelligence.

## LIABILITY FOR THE SUPERVISION AND REGULATION OF SPACE ACTIVITIES

The 1967 United Nations Outer Space Treaty recognizes States as internationally responsible for space activities. Article 6 of the Outer Space Treaty states that "States Parties to the Treaty have an international responsibility with respect to national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried out by governmental agencies or non-governmental entities, and to ensure that national activities are carried out in accordance with the provisions set forth in the present Treaty." Activities of non-governmental organizations in outer space, including the moon and other celestial bodies, should require the authorization and continuous supervision of the appropriate State Party to the Treaty. Whenever an international organization carries out activities in outer space, including the moon and other celestial bodies, the responsibility for compliance with this Treaty shall lie with that international organization and with the States Parties to the Treaty participating in that organization.

According to Article 6 of the Outer Space Treaty, it is the international responsibility of States to supervise space activities, whether these activities are carried out by a State or by a private entity under the jurisdiction of a State. Two essential elements, namely the issuance of the necessary permits and the supervision of space activities, play a fundamental role in attributing responsibility to States. The activities of private companies in outer space will require authorization from and continuous supervision by a Contracting State that has the necessary authority for this responsibility.

In fact, States have been recognized as the main players in space activities, regardless of whether the space activities are scientific or commercial in nature and whether they are governmental or private. States that are parties to the Treaty undertake to issue licenses for the space activities of their companies in accordance with national laws and to continuously monitor their performance. (von der Dunk, 2015: 1)

On the one hand, it follows from Article 6 of the Outer Space Treaty that States are obliged to monitor the performance of their public and private sectors based on the occurrence of unlawful conduct and internationally wrongful acts. International law is violated by any Contracting State when space activities of its public or private entities are carried out without a valid license or when the Contracting State does not maintain continuous surveillance of space activities.

On the other hand, it is inferred from the contrary meaning of this article that a State that properly and effectively implements a licensing and surveillance regime for its domestic entities is not held responsible. Therefore, the non-realization of the responsibility of a Contracting State is provable when it is proven that, despite the necessary supervision of space activities by the State, the activities that have resulted in damage have been carried out by the private sector illegally and without authorization in the territory of that State or under the jurisdiction of a third State.

It is also inferred from Article 6 of the Outer Space Treaty that the doctrine of wrongful act allows a claim of liability against a State that has failed to perform its obligation to authorize and supervise space activities under its jurisdiction, even if no damage has been caused. Under this article, sufficient evidence is found for the international responsibility of a State that authorizes space activities under its jurisdiction without proper and reasonable supervision. Therefore, the space law treaty regime does not impose any direct obligations on non-governmental entities.

In return, it assigns all responsibilities and obligations to space actors, i.e., states, and states that the space activities of non-governmental organizations are subject to limited oversight by states, and that the treaty

regime does not apply directly to the private sector. Therefore, if space actors do not conduct space activities under the supervision of their own state and instead conduct space activities under the authority of a third state, the question arises as to which state—the actors' own state or the third state—bears international responsibility for these private space actors. (Cheng, 1995: 307).

In international space law, regarding liability for compensation for damage or liability for registration of a space object, the launching State is recognized as the responsible State in the 1972 Liability Convention and the 1974 Convention on Registration of Space Objects, respectively. However, this term is not used in Article 6 of the Outer Space Treaty, which deals with the supervision of space activities. This article refers to the "appropriate State or competent State" and requires it to ensure that the space activities of its governmental and non-governmental entities are in accordance with the Outer Space Treaty.

Since neither this article nor any other article of the treaty regime on space law defines the term "competent State", there is no agreed legal standard for determining the "competent State". Of course, with a narrow interpretation based on the two Liability Conventions and the Registration Convention, the launching State can be considered the competent State, while with a broad interpretation, the competent State can be extended to States that are more suitable for supervising their subordinate institutions, even though they are not the launching State. (Cheng, 1998: 7).

The competent State, whether the launching State or another State, is responsible under the surveillance standard of "observance and negligence". The Contracting State must also exercise its responsibility for surveillance of the intelligent space object under the surveillance standard.

The State responsible has the duty to ensure that it has issued the necessary authorization for an intelligent space object launched by a non-State entity and has exercised appropriate supervision over its activities, regardless of whether it is owned or operated by one of its nationals. Therefore, by analyzing the standard of care of the occurrence of a specific event that caused the damage, the answer to the question of whether the competent State has issued the necessary permits for the activities carried out by the intelligent space object and has exercised sufficient supervision over it or not is different.

Here, if a state's public or private sector plays a role in the use of artificial intelligence in space technology and is not the launching state, then this state can also be held liable based on a broad interpretation, even though it is not the launching state. However, if only the launching state is held liable at the international level, new rules should be established in space law. (Dennerley, 2018:281).

Therefore, compliance with the standard of due diligence by an authorized State requires that that State ensure the issuance of authorization and supervision of space activities carried out using an intelligent space object. The subject of compliance with this standard is the provision of a flexible standard in space law. The commitment to "due diligence" is not a commitment to achieve a specific result. Rather, it is a behavioral and instrumental obligation that requires a contracting state to make sufficient and necessary efforts to prevent loss or injury to another state or its nationals.

The breach of this duty is not limited to the actions of the state but also includes the behavior of its nationals (Messerschmidt, 2013:303). However, based on flexible standards of supervision, it appears that the performance of an intelligent space object determines whether or not human intervention or supervision is required and, if so, what is the appropriate degree and extent of such supervision.

The flexibility of the standard of supervision is in line with the approach generally recognised by the European Commission (EC) on AI (European Commission, White Paper on Artificial Intelligence, COM, 2020). The EU's position is that human supervision is a necessary component of the use of AI, arguing that

human supervision ensures that "the AI system does not undermine human autonomy or create other adverse effects."

"Human oversight" requires appropriate human(s) participation, which may vary depending on the "intended use of the AI system" and its impact on individuals and legal entities, if any. The European Union has also identified some manifestations of human oversight in the use of AI, including:

(1) Review and validation of AI decisions before or immediately after the decision is made.

(2) Supervision of the AI system while it is operating and the ability to intervene in real time and deactivate the AI system.

(3) Implementation of operational constraints to ensure that certain decisions are not made by the AI system. Artificial.

According to the above, the European policy on providing a flexible framework for the specific issue of artificial intelligence in space technology could be a model for future use in international space law. This approach determines whether the competent State's performance complies with its standards of oversight in the case of a non-state intelligent space object that has caused harm in outer space. The standard of "oversight" could be assumed to be necessary" and adopted oversight for the liability of the armed State for damage caused by an intelligent space object.

This flexible standard allows the launching State, which is held liable in contractual cases, to argue that the home State of the non-State space actor has a greater role and responsibility than the launching State. Accordingly, the launching state can deny liability on the grounds that the state whose citizens play an active role in the use of intelligent space objects should exercise due diligence in issuing adequate permits and oversight.

This shifts the oversight obligation from the launching state to the country of the main non-state space actor. Failure by the State of the space actor to properly implement the standards of care in this regard may, depend on the circumstances, result in the exemption or reduction of the liability of the launching State.

**LIABILITY FOR COMPENSATION**

According to Article 7 of the Outer Space Treaty, in the event of damage caused by space activities, the damage must be compensated by the responsible State to the injured State. Article 7 of the Treaty states that "any State Party to the Treaty which launches or causes to be launched an object into outer space, including the moon and other celestial bodies, and any State Party from whose territory or installations an object is launched, shall be liable for damage caused by the said object or its constituent parts on the earth, in the air or in outer space, including the moon and other celestial bodies, to any other State Party to the Treaty or to its actual or legal nationals." International opinion bears responsibility.

The basic rules in Article 7 of the Outer Space Treaty of 1967 on liability for damage are set out in detail in Articles 2 and 3 of the Convention on International Liability for Damage Caused by Space Objects of 1972. However, Article 7 of the said Treaty is very general and does not specify on what basis compensation should be awarded. According to the wording of Article 7 of the said Convention, it is inferred that the launching State bears absolute responsibility.

The above-mentioned Liability Convention has explained the subject of liability for compensation for damage in a comprehensive manner and has separated the basis of liability for damage caused in outer space from damage caused on the ground and in the air, and has made the criteria for establishing liability the

place of occurrence of the damage, i.e. the surface of the earth and the air above the earth on the one hand, and outer space, such as orbits or celestial bodies, on the other hand. (Lee, 2003: 4).

Article 2 of the 1972 Liability Convention states that "the launching State shall be absolutely liable for damage caused by its space object to the surface of the earth or to aircraft in flight." Furthermore, Article 3 of the Convention expressly states that "Where damage is caused in a place other than the surface of the Earth to a space object of the launching State or to persons or property on board that space object by a space object of another launching State, the latter State shall be held liable if the damage is caused by the fault of that State or by the fault of persons for whom it is responsible."

According to the above two articles of the Liability Convention, liability based on strict (or specific) liability for damage caused by a space object to property and life on the ground or to aircraft in flight, and liability based on fault for damage caused by a spacecraft in outer space or to a celestial body such as the moon, has been formally recognized. Furthermore, the Convention emphasizes that the responsibility for compensation for damage lies solely with States, because non-state actors cannot be held accountable under international space law.

With the development of space technologies and the use of artificial intelligence in them, the potential for activities in the dangerous environment of outer space has become even more complex, such that the attribution and enforcement of liability for damage resulting from the use of space technologies, which use artificial intelligence, is challenged on the basis of Articles 2 and 3 of the Liability Convention.

Attribution to artificial intelligence should replace attribution to the behavior of individuals who have played a role in the breach of obligation and liability, and the question will arise as to whether the provisions contained in the Outer Space Treaty and the Liability Convention can also be applied to breaches of obligations and damage caused by artificial intelligence.

**Absolute Liability**

According to Article 2 of the Liability Convention, if a space object causes damage to persons or property on the surface of the earth or to aircraft in flight, absolute liability lies with the launching State. By accepting the principle of absolute liability, which usually deprives the responsible individual of any right of defense, there is no difference between damages resulting from an artificial intelligence decision and damages resulting from human behavior, and the launching state must compensate for the damage caused without resorting to the right of defense. However, the Liability Convention still recognizes the right of the launching State to "effectively compensate for damage caused by the negligence, fault or recklessness of the injured party".

According to Article 2 of the Liability Convention, launching States are fully liable for damage caused by their space objects on the surface of the Earth. At the same time, in these circumstances, there is no obstacle to the legal prosecution of countries that use artificial intelligence technologies and are not the launching state. The complexity of the issue becomes apparent when such liability is established within the framework of Article 6 of the Liability Convention, which states the abolition of the strict rule of Article 2. This article states that if "the launching State establishes that the damage was caused in whole or in part by gross negligence or by an act or omission of the claimant State or of natural or legal persons acting on its behalf with intent to cause damage", the claimant State cannot rely on the damage caused by the claimant State, since the claimant itself played a significant role in causing the damage.

The effective exemption from liability for damages in respect of a space object equipped with artificial intelligence is practically impossible, since gross negligence is conduct that occurs by a human being and not a machine. The concept of "gross negligence" is not defined by the Convention and only refers to the

“standard of care”. Some scientists conclude that "gross negligence" is, above all, a personal criterion and the result of the activity of the human mind, which in principle cannot be matched by the characteristics of a machine. Therefore, in the absence of clear criteria for expressing the "standard of care" and taking into account the fact that it has been established depending on the level of scientific and technological progress, the implementation of the relevant provisions in the Convention on Liability for Space Technologies Using Artificial Intelligence is accompanied by great complexity, and it seems that new rules should be established in international space law.

**LIABILITY BASED ON FAULT**

Article 3 of the Convention establishes liability for various activities in outer space as being based on fault but does not provide a definition of the concept of “fault”. There are no clear criteria for assessing fault, and States have broadened or narrowed this definition based on their own legal systems. It is relatively difficult to prove fault in the event of a collision between two spacecraft in outer space, and so far, no known case of damage in outer space due to a collision between spacecraft has been cited under the Liability Convention (Long, 2014: 8).

Now, the extent to which the use of artificial intelligence has led to damage and injury in outer space must be added to the difficulty of using artificial intelligence in technology in the event of a collision between two spacecraft. If the limits and scope of the interference of artificial intelligence are determined and its interference is less than the usual limit, the state that controls the spacecraft will be held liable under the Liability Convention. In other words, it is important to determine at what stage and to what extent artificial intelligence has been used in such technologies in the implementation of space operations.

Damages resulting from decisions made by AI or arising from data generated using AI technologies should be eligible. This depends on determining the extent of the direct and substantial impact of AI on space activities. The term “persons” used in Article 3 of the Liability Convention also raises questions regarding the use of AI in space technologies. The term “person”, as used in Article 3, usually refers to an entity, such as a natural or legal person, having legal rights, duties and obligations.

In interpreting Article 3 of the Convention, the responsibility for compensation for damage caused by a group or class of individuals must be assumed by the launching State. In a broader sense, this responsibility includes all individuals and all types of space activities. Generally, we refer to an individual or person as a human being. In the context of law, the term “person/individual” generally refers to an identity and nature that is subject to legal rights and duties.

Legal rules attribute legal personality to companies and legal entities and subject them to duties and rights. In addition, in certain specific cases, the law formally recognizes legal rights and obligations for some inanimate objects such as ships, lands, and goods, and gives them rights and imposes duties on them that are subject to judicial jurisdiction and to judgments against them.

However, in all the cases mentioned above, the legal rights and duties imposed on artificial entities such as corporations or inanimate objects arise from actions or behaviors performed by humans. The question now arises as to whether this basis should be extended to the issue of artificial intelligence as well. (Solum, 1992:1235)

The status of rights and obligations on people is not necessarily true for actions or behavior that are based on machine intelligence. A machine can learn independently of human information and behavior and make decisions based on existing learning and information, but this ability is not necessarily equivalent to acquiring real or legal personality for it.

Decisions and behavior of persons, both real and legal Ultimately, decisions are made by humans; in this sense, decision-making is not based solely on reason or data but is the product of various factors of human behavior such as intelligence, emotions, and choices.

If decisions and behaviors based on artificial intelligence are outside the scope of human supervision and management, without taking into account various factors of human behavior such as intelligence, emotions, and choices, attributing them to human behavior becomes difficult and It would be difficult.( Karnow, 1996: 190)

Therefore, since fault-based liability under Article 3 of the Convention on State Liability is based on the conduct of natural or legal persons, a decision-making by an intelligent space object may not be attributable to "individual fault".

Therefore, the assessment of fault-based liability under this Article, as opposed to a decision made by an intelligent space vehicle, is It depends on whether such a decision can be attributed to the launching State or the armed State. Liability based on the fault of a Contracting State should not be based solely on the decision to launch an intelligent space object; since the adoption of such a broad basis for liability would fundamentally affect the development and deployment of intelligent space objects and their use in space. Therefore, the question of liability in these circumstances depends on the answer to this question: When the damage is caused by an intelligent space object and human oversight is not involved in the occurrence of that damage, what conduct is necessary to attribute fault-based liability to a State (Kowert, 2017: 183)?

In view of the above, since Article 3 of the Convention provides for liability arising from "fault of the State" or "fault of individuals", it is difficult to determine how a decision taken by an intelligent space object can be considered as being liable. In the event of a collision between two spacecraft, it would be quite problematic to determine the liability of the launching State for damage caused by such an object, which acts completely independently.

To solve this problem, the complex and novel issues that arise regarding the standard of care, foreseeability of risk and damage, and proximate cause of damage, which are essential elements for establishing damage in liability claims, must be analyzed with regard to the issue of artificial intelligence, and it must be clarified how an intelligent space object can make decisions without the need for human action.

**RESPONSIBILITY FOR DATA PROTECTION AND PRIVACY**

In general, one of the main concerns of space law in recent years has been the sharing of data and information of individuals in space technologies, which is likely to lead to a violation of the privacy of members of society.

For example, data obtained through Earth observation can be analyzed using intelligent facial recognition technologies combined with location data and data obtained from security cameras, and ultimately disclosed. Therefore, the issue of maintaining their confidentiality and preventing access to them without the necessary permissions, as well as compensation for damages in case of ignoring these matters, is seriously raised. Kurkova & Soroka.2019:135)

In space exploration, the use of artificial intelligence puts the identity of individuals at greater risk. For example, very high-resolution imaging satellites are used to scan landscapes and streets, inspect them, and capture images of buildings, cars, etc. for various purposes, including public announcements.

Users of these images may identify the areas being surveyed or the individuals in their vicinity. They can recognize them and their movements, as well as their social patterns, and misuse this information. Active and advanced satellites can process data and information about people on the active satellite in orbit, using

artificial intelligence in their mission programs, without the need for These satellites would be processed by humans in centers on the ground.

In this case, only information relevant to the ground would be transmitted, thus not only saving on communication costs with the ground and vice versa but also allowing ground analysts to focus on the information that is most important. Experts can develop algorithms using artificial intelligence to analyze data, recognize images, and make automatic corrections, allowing users to track people's assets and any movements they make in any country.

Therefore, with the use of artificial intelligence in data processing, the risk of misuse of spatial data and information increases. Also, the use of artificial intelligence in space technologies by government agencies for extensive surveillance is of great importance for ensuring security. Thanks to satellite images, illegal cultivation of drugs can be seen in farms, and legal institutions can prosecute offenders based on evidence. However, these uses may violate laws related to the protection of personal data and information. The use of this spatial data and information can violate human rights, especially in cases of discrimination and when there is arbitrary intervention by state and non-state institutions, and no trace of human action can be found that can attribute these actions to him.

Based on the above, the issue of management and supervision of non-disclosure of information and the correct and lawful use of space data and information, and the responsibility of states for protecting the privacy of individuals within the framework of the responsibility of states for monitoring space activities and compensation for damage, should be reviewed from an international perspective.

On the one hand, existing international regulations, in particular Articles 6 and 7 of the Outer Space Treaty of 1967, should be adapted to these circumstances to determine whether they are applicable to these circumstances or not, and, on the other hand, due to the importance of the issue, new specific regulations should be developed for the use of data and information generated by space technologies equipped with artificial intelligence in order to eliminate legal gaps (von der Dunk, 2013: 249).

First, to address the liability of States for surveillance and damage caused by AI decision-making regarding data and information derived from space technologies, the provisions contained in international space treaties should be examined. As noted above, Articles 6 and 7 of the Outer Space Treaty impose international liability, without exception or qualification, on the competent State or the launching State.

Therefore, if the performance of intelligent space technologies is compatible with the launching State or the State registering the space object, international liability regulations are applicable. However, as stated in the previous section, these space treaties do not provide for liability based on fault in the absence of human intervention in causing damage and, to ensure liability against data surveillance and violations of individuals' privacy, compensation for damage caused in space by an intelligent space object may have to be pursued and considered in other ways.

If a claimant State seeks compensation for damage or injury caused by an intelligent space object that is not covered by the definition of "damage" in Article 1(a) of the 1972 Liability Convention, such as damage resulting from the dissemination of data and the invasion of the privacy of individuals, it may be resolved by a broad interpretation of Article 7 of the Outer Space Treaty, as this article does not limit damages to material damage.

The 1972 Liability Convention expressly states that one of the main purposes of its codification is to establish rules and procedures relating to liability for damage caused by space objects, but the Convention does not claim that its rules and procedures should be excluded when assessing liabilities arising from means other than the Liability Convention.

Neither the Outer Space Treaty nor the Liability Convention precludes compensation for damage under Article 7 of the Outer Space Treaty. This is particularly important in view of the general principle of international law that "what is not prohibited is permitted." In other words, in a particular case, it is not necessary to indicate the rules of permissibility as long as there is no prohibition.

If, under Article 7 of the Outer Space Treaty, compensation for damage is not available under the Liability Convention, Article 7 of the Outer Space Treaty provides sufficient flexibility to address issues related to liability for the operation of intelligent space objects to address liability for the surveillance of their activities, as well as potential damages from disclosure of information and violation of the privacy of individuals. (Tricot &Sander, 2010:323)

Despite the broad interpretation of Article 7 of the Outer Space Treaty to protect individuals and their privacy, new international rules and regulations are needed, because clear and transparent rules can help to resolve disputes between States regarding liability and compensation for damages.

At present, separate rules and regulations are needed to address problems related to the use of artificial intelligence in data processing and Information has been compiled by some legislators at the regional and national levels, which can be used as a model in space law to deal with AI decision-making at the international level.

As mentioned, one of the important and noteworthy documents is the General Data Protection Regulation in the European Union, which came into force in 2018. Shaping Europe's digital future, "A European Strategy for data"

The European Strategy for the use of artificial intelligence in technologies, in addition to The acquisition of information to create an agile, secure, and dynamic economy in the world, improve decision-making, and provide a better life for all citizens, is focused on determining a surveillance framework for the future by creating a "trust/assurance-based ecosystem." To do this, it is necessary to ensure compliance with EU law, including the law on the protection of fundamental rights and consumer rights, in particular with regard to high-risk AI systems. EU regulation is therefore focused on building trust between consumers and various stakeholders in the field of AI and on informing them about the risks of AI. (European Commission,White Paper on Artificial Intelligence, COM, 2020)

The United States is also among the technologically advanced countries that are trying to recognize legal actions against incidents related to artificial intelligence and to regulate and codify such actions. In general, legal actions for compensation for damage caused by a device or machine have been recognized based on the negligence claim of the owner or user and based on the theory of producer liability, which The finding of negligence requires human intervention.

It seems logical to hold a manufacturer liable for a defect in the design or construction of software and failure to warn of foreseeable harm. A defect in the design of a product or technology occurs when there is a risk of foreseeable harm, and the designer could have avoided that risk or reduced the likelihood of that risk by using a reasonable alternative design. Defective Design Manufacturing occurs when a product is not manufactured according to specifications and standards. Accordingly, negligence also occurs when the responsible party fails to properly follow "instructions for the safe use of software" (Giuffrida, 2019: 440).

## CONCLUSION

The use of artificial intelligence in space technologies in enhancing its applications is undeniable. The development of artificial intelligence technologies creates unprecedented opportunities for space exploration and the implementation of new types of space activities.

However, space objects launched into space by governments and private players are becoming increasingly technologically sophisticated and increasingly equipped with artificial intelligence technologies that enable space technologies to operate without human intervention. Such devices are used in particular to monitor the performance of satellites, act as assistants to astronauts, and conduct research when conditions are dangerous to humans.

The use of space technologies equipped with artificial intelligence will be accompanied by unintended consequences that arise from the use or misuse of such tools. Just as the use of artificial intelligence can be very useful and beneficial for the provision of social services, the use of this technology for the wrong purposes or by the wrong people can also cause significant harm to governments and people.

Space law should seek to address issues of oversight of the performance of artificial intelligence in space technologies, as well as liability in the event of damage. Damage can be both material, such as endangering the safety and health of individuals, loss of life, damage to property, and non-material, such as violation of privacy, restrictions on the right to freedom of expression, human dignity, or discriminatory actions in various matters.

In addition to the responsibility for monitoring activities and liability for damages, space law should also address the monitoring of data and information storage, as well as the protection of individuals' privacy; in particular, the lack of a specific monitoring framework for non-state space actors, who often disregard individuals' privacy, could seriously harm the regulation of space activities in the future.

The mandatory space treaties do not explicitly address the use of artificial intelligence, and no other international space regulation addresses the use of artificial intelligence in space.

The lack of international regulation on artificial intelligence creates complex and potential problems regarding the applicable law in resolving disputes between States over liability for the use of artificial intelligence in space technologies. If the use of artificial intelligence in space activities or a space object causes damage to another space object that is identifiable under the Convention on International Liability for Damage Caused by Space Objects, it is unclear whether the substantive rules and regulations that are used to determine issues related to the resolution of the level and quality of the claim, such as the standard of care and what constitutes fault-based liability, would be applicable.

According to a broad interpretation of Article 6 of the Outer Space Treaty, the responsibility of States in international space law is considered within the framework of surveillance based on the standard of “surveillance and oversight”. A Contracting State under the standard of surveillance must also exercise its responsibility for surveillance over a space object that uses artificial intelligence.

The State responsible has a duty to ensure that the necessary authorization is issued for the launch of an intelligent space object by a non-state entity and to supervise it; if a State’s space actor plays a role in the use of artificial intelligence in space technology, this State can be held liable based on a broad interpretation.

Compliance with the standard of due diligence requires that a State Party ensure that the necessary authorization is issued for space activities carried out using an intelligent space object and that that State supervises those activities. The subject of compliance with this standard is the provision of a flexible standard in space law.

The obligation to “due diligence” is a behavioral obligation that a Contracting State must take supervisory measures to prevent harm to another State or its nationals. Also, in order to determine the liability of States for compensation for damage, with a broad interpretation of Article 7 of the Outer Space Treaty, in addition to establishing the absolute liability of States for damage to property and persons on the ground and on

aircraft caused by their intelligent space technologies, States can be held liable for the conduct and performance of natural and legal persons on the basis of negligence whose intelligent space technology has caused damage in outer space. The determination of liability for damage caused by an intelligent space object in outer space is related to the ability to attribute fault-based liability to a State.

As stated, in addition to the possibility of a broad interpretation of Articles 6 and 7 of the Outer Space Treaty of 1967, it is possible to follow the example of the national space laws of some countries and encourage other countries to adopt this type of law. European policy on the specific issue of artificial intelligence in space technology could serve as a model for future explicit use in international space law.

This approach aligns the functioning of the armed state with its standards of care in the event of an intelligent space object causing damage in outer space. Presumably, the standard of "due care" and oversight could be adopted for the liability of the armed state for damage caused by an intelligent space object. This flexible standard allows the primary space player state to be held accountable.

Since these regulations lack the clarity and transparency required to address the issue of artificial intelligence, and the Contracting States do not play an effective role in decision-making on artificial intelligence in space technologies, given the growth of private sector space players, it is desirable for the international space community of states to develop specific regulations within the framework of soft space law, i.e., guidelines and resolutions, and to encourage the Contracting States to follow their example. Develop and implement national space regulations related to the oversight of space actors that use artificial intelligence in their space technology, and then, after establishing a specific procedure in the national space laws of countries, international space institutions, such as COPUS, develop international regulations to establish the responsibility of the state responsible for overseeing the performance of the space actor.

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