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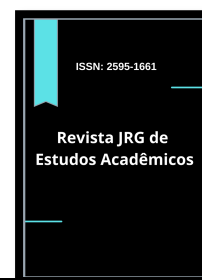
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### Clarify Artificial Intelligence (AI) decisions models rights in Intellectual Property (IP) system

Esclarecendo os direitos dos modelos de decisão de Inteligência Artificial (IA) no sistema de Propriedade Intelectual (PI).

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### Abstract

The paper explores the relationships between Artificial Intelligence (AI) and Intellectual Property (IP) system of rights protection. The discussion clarify the characteristics of IP system, who is the registered owner, what is the registration object, and where the registration takes place. The research seeks WIPO's advice and the general trend of AI experts' discussions and tries to dig deep into definitions and meanings. The research also shows the mainstream explication why AIs not entitled as owner of an IP. In other case AI's integrated into a process or a digital product a AI tool to solve a well-known problem, it is part of the organization's management and resources. Thus, innovation's certification belongs to the company or the public organization that sponsored it. The result of the research shows a summary framework of all the rights when used as a tool for decisions and risk of assuming AI as a system or as a model to support decisions specially for Public Administration.

**Keywords:** Artificial Intelligence. Intellectual Property. Innovations. Public Administration. AI decision support systems.

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## Resumo

*O artigo explora as relações entre o sistema de proteção de direitos de Inteligência Artificial (IA) e Propriedade Intelectual (PI). A discussão esclarece as características do sistema de PI, quem é o titular registrado, qual é o objeto do registro e onde ocorre o registro. A investigação procura o aconselhamento da OMPI e a tendência geral das discussões dos especialistas em IA e tenta aprofundar-se nas definições e significados. A pesquisa também mostra a explicação principal de por que as IAs não têm o direito de serem proprietárias de uma PI. Noutros casos, a IA está integrada num processo ou produto digital, uma ferramenta de IA para resolver um problema bem conhecido, faz parte da gestão e dos recursos da organização. Assim, a certificação da inovação pertence à empresa ou ao órgão público que a patrocinou. O resultado da pesquisa mostra um quadro sumário de todos os direitos quando utilizados como ferramenta de decisão e risco de assumir a IA como sistema ou modelo de apoio a decisões especialmente para a Administração Pública.*

**Palavras-chave:** *Inteligência Artificial. Propriedade intelectual. Inovações. Administração pública. Sistemas de apoio à decisão de IA.*

## 1. Introduction

Artificial Intelligence tools make computer software respond to questions, perform tasks, and develop limited or defined autonomous decisions based on rules. AI is an autonomous decision process in back office and industrial processes for technical and commercial purposes without human interfaces. AI application examples are humanoid robots and even software that suggests music. AI software in unmanned cars or AI-driven cars has sensors to transmit an evaluation. Thus, the car AI processor establishes the speed or the direction the AI process does not need to communicate with the passenger and only performs an automated task.

In economic and social environments, AI system fast-growing interfaces benefit from the increased computational speed and capacity of new processors and allow new algorithms to be performed faster, replicate, or simulate a chat between humans and machines. AI has a great commercial success because it mimics the machine having a dialogue with humans. The communicative performance of AI allows people with no computational skills to use AI.

AI applications are not a disruptive innovation. AI model started more than fifty years ago and actual AI application models use different approaches to computing processing power growth and the development of a data science based on statistic models adding network capacity called machine learning. The machine algorithm has its process done so, and after that, the computer reassembles data as a communication simulation. The new AI attractiveness, versus the old AI systems and systems without mimics is user-friendliness.

In this context, many issues about AI in today's discussion are on AI use in all human activities. The research justifies itself by explaining AI's growing use as a support decision tool. The aim is to focus on AI's intellectual property (IP) impacts or the register of AI outcomes of the innovation process. In particular, the research wants to clarify AI tools to support decision systems for Public Administration.

The IP system and AI regulations cannot clarify and define all the relations between the AI model tools in the IP right system. The result of the paper is a framework of AI IP's relations characteristics and identifies the use of AI when there are IP rights registrations in support decision systems trying to orient AI decision support system generation.

## 2. Methodology

The paper discusses and aims to clarify AI systems decision support and IP system relations. It uses a deductive method based on bibliographic research to explain the relationship between intellectual property and Artificial Intelligence. The research was in 2023 and early 2024 through the internet and in the WIPO, other IP rights agencies sites, and European Union sites about AI regulations.

The research explains why AI is not eligible for ownership in IP system registration as a tool or a model. The registration of an AI tool is entitled to the program inventor as a patent, an industrial secret, or a sui generis software program.

A step-by-step discussion explains the research. The process starts with the context of AI and IP system explanation. Next, it aims to clarify the secondary objectives of the paper and the following interest points:

- IP system approach to AI
- Actual discussion of AI as owner or tool in IP property right system
- Uses of AI in Public Administration Supporting tool for decision

The result is summarized in a conclusion section and shows AI's actual mainstream position as AI's IP rights owner or AI tool for decision-making for Public Administration. The actual IP system, however, has not clarified AI models used in the invention and innovation process, and the question about AI tools as IP registers remains unsolved.

## 3. Discussion

The paper discussion is divided into five sections as presented in the methodology. The first section summarizes and explores the AI definition while the second explores IP and AI legislation. The following three sections explore the IP system approach to AI, the actual discussion of AI as an owner or tool in property rights, and the uses of AI as a Public Administration supporting tool for decision.

### 3.1. Artificial Intelligence (AI)

Late in 1950, Alan Turing wrote the question: can machines think? Should change by whether or not machinery can show intelligent behavior? He created the Turing test and measured the machine's ability to simulate human conversation (TUNING 1956). But with this method does not matter if the machine is thinking as we observe the result. Today AI's approach shifte to seek intelligence in terms of problems with measured solutions.

Turning's AI definition, following Russel and Norvig (1998), works in terms of acting (doing a conversation) and not thinking or deciding. So, they were critical that the test could compare machines to *people*. Artificial intelligence is not, by definition and structure of programs, a simulation of human intelligence. For that McCarthy (1950) defined Artificial Intelligence as the computational part of the ability to achieve goals, and Minsky (1980) similarly defines it as the ability to solve problems. Other approaches are for example Google's to measure the ability of systems to synthesize information similar to biological intelligence.

Whatever the approach, for a general definition of AI, the real fact is that what is called AI is software programs and special programming rules that consuming always more computing resources. The AI model is developed to be able to perform research, to "learn" from the research data, and to be able to classify it. Then the AI

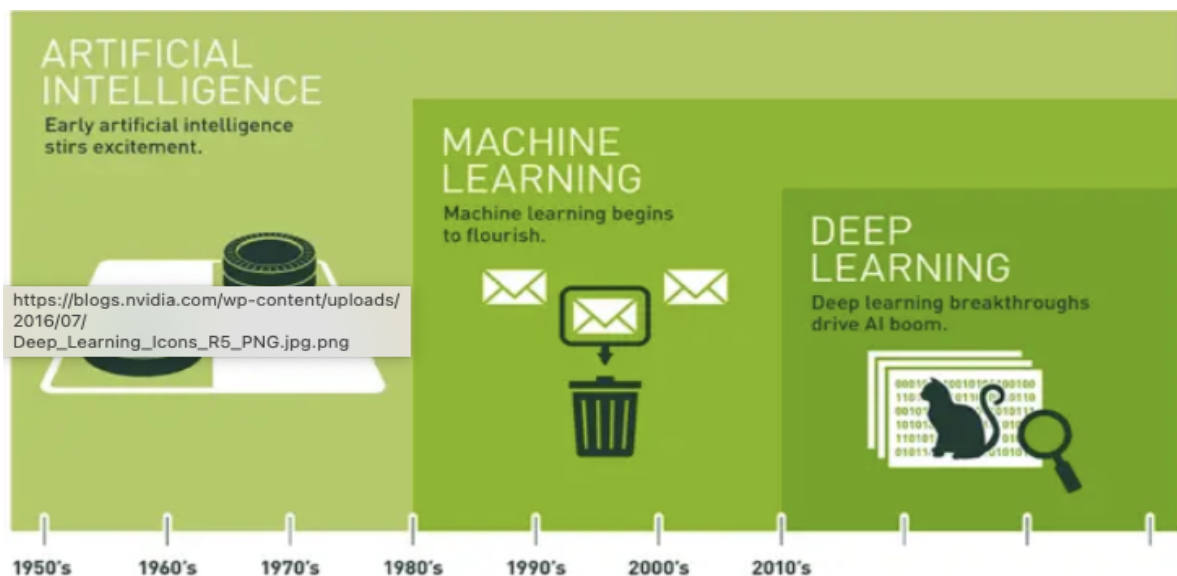
process uses the data to prioritize the path of successive routines to activate other searches till a conclusion.

Thus, it doesn't mean there is a unique and real conclusion or the optimized outcome expected. The AI result of a model is not even a result. AI tools cannot deliver a definitive outcome because doesn't know how to explain it. There are case of having no result. It happens when AI has no data, for example about someone, or when can't be used for some reason some data collected, or when the search makes no sense, and so on.

Like Human Intelligence, Artificial Intelligence cannot solve all problems and answer all questions and certainly can't have a "correct" reply to our questions. It is a tool that extent human knowledge and a mean of possible results. AI applications have some benefits like a fast reply to middle-level and quantitative questions, the knowledge of thousands of manuals and academic textbooks to create a good canvas of arguments for basic research, it is reliable for mathematic problem solutions and, in general, can save time and give more information than every human could be able to do, due to thousand and millions of data stored in the internet that are impossible to be scanned in short by every human.

Source <https://blogs.nvidia.com/blog/whats-difference-artificial-intelligence-machine-learning-deep-learning-ai/>

As showed in the figure above, the main components of an AI model are:



- Engineering process of extraction or identifying a minimal set of informative features or attributes from the provided dataset. The AI model includes the performance of machine learning processes. Deep learning architecture has hidden layers between the input and output layers. These models employ supervised program steps to train with well-labeled datasets. High-performance parallel-computing GPUs can drastically reduce The performing time of the model.

- Artificial Neural Networks that comprise weighted interconnections. Using AI programming language, an Artificial Neural Network between the set of computing nodes at consecutive layers. There are algorithms to define the optimal weights of

connections deduced in the learning phase. Technically, each node calculates the weighted sum of values propagated to its input. An activation function regulates the criteria for computed values to feed forward to the next layer. So the process goes on using a series of steps. It's a recursive process that works on constituting feed-forward and back-propagation stages, weights, and other network parameters. The process converges to optimal values that end up with the most appropriate model.

The outcome of these AI processes has, as was said, some weaknesses. The main are:

- AI uses algorithms only simulate a learning process. Is not a human learning process, but, as a human outcome, an AI-resulting model could be wrong or the conclusions make no sense or a bad sense.
- Inside the machine learning process, there is a black box. Nobody knows how the model outcome is defined during the process. Only the AI could explain every step. Again as Humans, it is difficult to understand how the outcome model could be replicated and explained
- AI is essentially "stupid". It can work with a large amount of data but fails in the reason and the purpose of the work. So it can substitute humans in well-defined problems with defined outcomes (MacCarthy and Minsky) it proves to be successful in games like Chess or in finding mathematics solutions. However, it fails when a deep integration is needed to reality. The same happens when adding ethics, social, and human variables to solve a problem.

A cognitive and sensorial information (to give AI sensors like in unmanned car systems) like a biological form of learning is something that could improve actual AI models. Many experiments are today developed in many fields, as well as their use in human activities. The economy, society activities, and professional work are using AI. An integration between Human and machine intelligence (or sensor) is something today developed with digital extensions to human like watches, glasses etc.

To have sensors is only to increase data source and data processing. The online AI process is a fake of the human reasoning because the AI program doesn't know the significance of the source of data it only as a model that classify this data. For AI systems the environment, climate, social or psychological data are the same thing: only numbers.

### 3.2 The Intellectual Property (IP) system

The World Intellectual Property Organization (WIPO 2022) is a specialized agency of the United Nations responsible for promoting and protecting intellectual property (IP) worldwide. WIPO provides a framework for international cooperation in intellectual property and administers various treaties and conventions that harmonize IP laws across different countries.

Intellectual property (IP) refers to creations of the mind, such as inventions, literary and artistic works, designs, symbols, names, and images used in commerce. National and international law protect Intellectual property. However, the classification varies all over the world (WIPO 2022).

Here are the main types of intellectual property defined and protected by WIPO:

-Patents: Definition: A patent is an exclusive right granted for an invention, a product, or a process that provides a new and inventive solution to a technological problem.

Protection: Patents grant inventors exclusive rights to make, use, and sell their inventions for a limited period, usually 20 years from the filing date.

-Copyright: Definition: Copyright protects the rights of creators in their literary, artistic, and musical works. That includes books, music, paintings, sculptures, films, and other forms of creative expression. Protection: Copyright provides the creator with the exclusive rights to reproduce, distribute, perform, and display their work. The protection typically lasts for the lifetime of the creator plus a certain number of years.

-Trademarks: Definition: A trademark is a distinctive sign that identifies and distinguishes the goods or services of one party from those of others. Trademarks can include words, logos, symbols, and other elements. Protection: Trademarks protect the goodwill and reputation of businesses by preventing others from using similar marks that may confuse consumers.

-Trade Secrets: Definition: Trade secrets are confidential business information, such as formulas, processes, and methods, that provide a competitive advantage. Protection: Unlike patents, trademarks, and copyrights, trade secrets are protected without registration. Protection is maintained as long as the information remains confidential and measures are taken to keep it secret.

-Industrial Designs: Definition: Industrial designs refer to the visual design of objects, such as the shape, surface, or ornamentation of a product. Protection: all industrial design grants exclusive rights to the visual aspects of a product for a limited period, typically 15 to 25 years.

- Geographical Indications: Definition: Geographical indications identify products as ones originating from a particular place and having qualities, reputation, or characteristics that are essentially attributable to that place of origin. Protection: Geographical indications protect the rights of producers and prevent the use of misleading indications on products that do not originate from the claimed place.

### **3.3. AI owner of property right for innovation in IP system discussion**

The great number of AI applications in the real economy is increasing. AI is capable of supporting decisions and resolving autonomously tasks where the decisions are defined and have only a few solutions like autonomous car driving. It is possible to refine AI autonomous decision systems. That must be regulated if we want to avoid an AI system monopoly in every process.

Is AI fair for humankind's story as some AI evangelists claim (AVENI 2023)? What if a group of a few technology corporations will be owners of the whole stock of Intellectual Properties using AI as certificate programs, innovations, and trademarks in the future? The danger of an AI-generated innovation incontrollable proliferation that could claim IP registration must be reduced or expanded.

The relations between AI and IP have a great interest because of the increasing influence of information technology data science on innovation processes and the capacity to register AI outcomes as patents, copyright, and other IP rights. Moreover, the intellectual property System is a pillar of the economic system to protect innovations and property rights. The certification of intellectual property grants international protection against fraud.

WIPO conversations are regular discussion sessions. A WIPO Conversation is an open, inclusive, multi-stakeholder forum intended to provide a forum to discuss the impact of frontier technologies and AI on all IP rights. The sessions aim to bridge the fast-moving and complex field of information technology to fair and better regulation.

In these conversation sessions, participants, who could be experts in intellectual property, policymakers, industry representatives, academics, and other stakeholders, engage in discussions on a wide range of topics. These discussions cover recent developments in IP law, emerging technologies and their impact on intellectual property, strategies for promoting innovation and creativity, challenges in IP enforcement, and global efforts to enhance IP protection and enforcement.

The discussions share experiences, best practices, and insights from different perspectives, to foster collaboration, raise awareness, and find solutions to common challenges in the field of intellectual property.

WIPO Conversation on Intellectual Property (IP) and Frontier Technologies - Ninth Session was in March 2024 about Training the Machines – Bytes, Rights and the Copyright Conundrum. The conversation has a great interest in the AI models formation. Training data is central to the success of all current AI systems.

The quality of data must be controlled because is collected from all available sources most of them public and often contain works that are copyright protected. The use of AI has a great impact on training data on IP-registered models like decision tools. Moreover, private corporations and governments are increasing the use of such AI systems.

It is also claimed that The IP system fosters innovations. Some scholars (CUNZ, FINK, and STAMM 2024) remember that Kenneth Arrow said the inventive process faces an intrinsic market failure (ARROW, 1962). An invention could be defined as a public good. This implies that many people can simultaneously use it and the original inventor may not prevent them from doing so. So a patent system solves the appropriability of inventive activity by affording exclusive rights to an invention. It makes sense to do this because the patent enables innovators to have a financial return and to fund R&D. This market-driven solution fosters innovation opportunities taken by individuals and companies who are best informed about such opportunities and are interested in dedicating time and resources for this venture.

AI applications and models, however, are not disruptive innovations that could change one market and cannibalize old products or services. AI model started more than fifty years ago and actual AI application models, generally speaking, have different approaches because of computing processing power growth and the development of a data science based on statistic models adding network capacity called machine learning. There are two main parts of the chat. The machine algorithm has its process done so, and after that, the computer reassembles data as a communication simulation. So AI models technically are not autonomous creations of intelligent machines because they need hardware and software and maintenance (i.e. electricity power facilities) to work.

Again between types of innovation, the Oslo Manual (2005) defines innovation activities. These include all developmental and new processes, for example, financial and commercial activities undertaken by a firm like: R&D activities, engineering, design and other creative work activities, marketing and brand equity activities, intellectual property (IP) related activities, employee training activities, software development and database activities, activities relating to the acquisition or lease of tangible assets, innovation management activities.

A business innovation is a new or improved product, service, or business process introduced on the market or brought into use by the firm (or a combination) that differs significantly from the firm's previous products or business processes. Following the OECD OSLO Manual (2005) Business process innovations include different functions of a firm. Two functions relate to a firm's core activity of purchasing, producing, and delivering products for sale, while the others concern operations such as TI, Organization, Supply, etc.

Thus, to define the IP right of an innovation generated with AI models is a complex matter. For example, if an AI program creates a new process or part of a new process and business benefits or is used as a decision or processing tool. But the question is who's the innovation owner? The organization that develops AI or the business uses a tool or a program made only to answer problems. But in the process, there must be a division of value-adding attribution. It seems a difficult task. The only solution is a preventive agreement before the patent is registered.

The ineligibility of AI outcomes as the owner of an intellectual property certificate does not prevent AI from being used as a tool for humans and organizations to have IP rights registered. The difference between the subject of rights and the innovation developer must be clear. The IP system guarantees the rights and an audit of the innovation and avoids fraud. However, a researcher may use AI systems and models to support the process or even autonomously generate a process.

The IP system is not perfect. For instance, fails to define the certification when AI tools are involved in the actual and future innovations as an innovation development ecosystem as in the metaverse. This is an information technology ecosystem that uses virtual reality technology, Web3, and blockchain. New regulations of intellectual property (IP) laws are extended to both physical and virtual objects. However, it is not clear how they respect the rights of inventors, designers, and owners of trademarks.

However, if AI tools support the steps like choose, discover, evolve, accelerate, scale, extend, or the central steps of the innovation process, part of the workload could be shifted to machine learning and machine automation, leaving Aspire and Mobilize part of the process only to humans' decisions. It is possible, technically, to develop a model that decides how to start an innovation process.

Even in this case, it is impossible to say that a machine is starting autonomous basic research because it needs someone to start a program or the process. AI models also need databases filled by human autonomous products. However, AI support is high in some innovation processes. The results depend on the capacity of AI joined to hardware, software, and people.

In other words, at least for business innovations, it is hard to advocate that AI generate autonomously basic research that could discover opportunities and match already developed technologies to start innovation. So autonomous decisions, objectives, and involvement of an organization belong to humans because a context of resources, objectives, and motivations is far to be the capacity of actual computing models. However, AI models act as a subject and perform tasks that used to be done by humans.

There is little evidence of AI systems as inventors on patent applications. The DABUS Patent Applications Case is a unique case of AI ownership today. In 2019 and 2020, an AI system named DABUS (Device for the Autonomous Bootstrapping of Unified Sentience) was listed as an inventor on patent applications filed in several jurisdictions. The applications related to inventions in the fields of food containers and flashing lights for attracting attention. The applications, however, faced rejection in



various jurisdictions, including the United States and the European Patent Office, because the listed inventor was not recognized as a legal person.

However, in AI as an Inventor case in 2021, the Federal Court of Australia ruled that AI cannot be recognized as an inventor under Australian patent law. AI system DABUS was listed as the inventor but finally, Australia concluded that the law requires an inventor to be a natural person and that an AI system does not fit this definition.

According to Iza Razija Mešević (2023), Some of the IP categories that were considered need to be reassessed, and re-evaluated in the light of the “power of AI” like the concept of the author, the concept of the inventor, the notion of originality of a work of art, the criteria for assessing the inventive step etc. If AI’s inability to act as an autonomous agent is confirmed in the international IP system, possible legislative interventions could introduce legal certainty maintaining core values of copyright law or human-centric invention principle.

Swiss Zurich University’s Center for Intellectual Property and Competition Law is conducting with the Swiss Intellectual Property Institute research in the AI context. (PITCH and THOUVENTIN 2023). The authors assess that patents should be allowed the designation of AI systems as inventors. Humans could be designated as proxy inventors. Where an AI system generates inventive output without inventive human intervention, the patent application should be permitted and the AI system as the inventor. A legal entity/person must claim ownership of the patent application and a resulting patent.

According to Picht, Peter Georg and Brunner, Valerie and Schmid, Rena, Artificial Intelligence and Intellectual Property Law: From Diagnosis to Action (on May 28, 2022), patent registration must follow a human-centric attribution. In copyright are required barriers. Revised Swiss copyright law permits (Schutzschranke) the use of works for scientific research. Art. 24d of the Swiss Copyright Act does not explicitly mention text and data mining by name but names a reproduction as such, which is caused by the application of a technical process.

That causes a barrier to copyright in AI-generated works (PITCH, BRUNNER, and SCHMID 2022) because text and data mining (TDM) involves final works’ duplications. The Swiss barrier has a parallel with UK rules lawful access to the work is a precondition for the text and data mining barrier to apply. A barrier cannot be derogated by contract clauses. The exemption does not cover the reproduction of databases.

The cited paper shows the possible assessment of AI as an owner. That includes business models of AI innovation leaders and inventorship/creatorship of AI systems. The discussion is necessary to protect AI inventions; the allocate of entitlements and liability regarding such innovations; AI-related revisions in the guidelines of important patent and trademark offices; the use such offices make of AI tools, the need for new protection carve-outs (for example to foster text and data mining), as well as AI’s potential raising the bar- effect. “(PITCH, BRUNNER and SCHMID 2022. pg.2)

A deep understanding of AI impacts and eligibility for certification depends on types of IP certification, barriers, and national legislation. However, there is no discussion of a new IP type/category linked to AI and data science development and its use in innovation. There are different dimensions of that problem. First, there is the generic use of AI tools, second the use of AI tools in innovation processes, and third the development of AI tools.

Finally, it is remarkable the AI European approach. That follows a series of initiatives undertaken in recent years, including the public consultation on the White Paper on Artificial Intelligence (COM 2020); the Final Ethical Guidelines for Trustworthy Artificial Intelligence of the High-Level Panel on Artificial Intelligence, published on 2019; the Report on Accountability for Artificial Intelligence and Other Emerging Technologies, from the Panel on Accountability and New Technologies, published on 2019; the Declaration of Cooperation on Artificial Intelligence, signed by 25 European countries on 2018, which builds on the achievements and investments of the European research and business community in AI and establishes the basis for the Coordinated Plan on AI.

EU Artificial Intelligence Act (EU 2024) aims to classify and regulate AI applications by risks. The classification uses an expected risk assessment to cause harm. The categories of risk are the following: unacceptable, high, limited, and minimal. Unacceptable risks using AI are banned. High-risk ones have a set of prerequisites and a conformity assessment to comply with such security, transparency, and quality obligations. Limited-risk AI applications have transparency obligations. Minimal risks are not regulated.

The European Act uses regulation of algorithms to lower the risk of losing control over which impact on human life increases. Examples are regulations in the case of automated credit score calculation and diverse domains ranging from criminal justice to healthcare. In particular, are forbidden:

(a) the placing on the market, putting into service, or use of AI systems that use subliminal techniques beyond the awareness of a person to significantly distort the behavior of a person in such a way as to cause or likely to cause that person or another person physical or psychological harm;

(b) the placing on the market, putting into service or use of AI systems that exploit any vulnerability of a specific group of people, due to their age or physical or mental disability, to significantly distort their behavior in a way that causes, or may cause, physic or psychological harm to you or others;

(c) the placing on the market, putting into service or use of AI systems by or on behalf of public authorities, which assesses or classifies the trustworthiness of natural persons over a specified period based on their known or predicted social behavior or personality or characteristics using a social score that determines one or both of the following:

- prejudicial or unfavorable treatment of certain natural persons or entire groups of natural persons in social contexts that have no relation to where data are generated or collected originally;

- prejudicial or unfavorable treatment of certain natural persons or entire groups of natural persons which is disproportionate to the seriousness of their social behavior;

(d) the use of "real-time" remote biometric identification systems in publicly accessible spaces for law enforcement purposes, unless and to the extent such use is strictly necessary for any of the following reasons:

- the targeted search for potential crime victims, including missing children;

- the prevention of specific and imminent threats to the lives of people or terrorist attacks;
- the detection, location, identification, or criminal prosecution of a perpetrator or suspect of a crime punishable by a maximum sentence or measure of at least three years.

#### **4. RESULTS: AI supporting tool for decision and Public Administration**

This final section focuses on AI-generated decision systems as a tool. According to the literature above, AI decision-making tools are registered as sui generis or software programs. WIPO agency itself uses AI systems, like many other organizations, in patent searching and analysis; trademark classification and examination; IP data analysis; language translations; IP enforcement, and anti-counterfeiting involving image recognition, text analysis, and other AI techniques to identify counterfeit products and pirated content; administrative efficiency.

Public administration uses AI systems to enhance the effectiveness, efficiency, and accessibility of intellectual property services and resources. AI system to support decision-making is a software application that aims to assist humans in understanding complex information, identifying patterns, assessing risks, and optimizing decisions in real-time or strategic contexts and has a large diffusion. Moreover, the academic approach lacks a contextual and processual understanding of AI adoption and diffusion in public administration (Madan and Ashok, 2023)

Public Administration uses AI as well as corporations in Financial Trading Algorithms analyzing market data, news articles, and historical trends and commodities, for example, e-procurement systems with DOA (AVENI and ULISSE 2022.); Healthcare Diagnosis Support Systems to assist healthcare professionals in diagnosing diseases and recommending treatment options; Supply Chain Optimization Software to improve inventory management, demand forecasting, and logistics planning. (Neumann, Guirguis and Steiner 2024, Veronesi, Altanlar, Sarto and Kirkpatrick 2022)

AI's economic decision systems can be applied in public administration in this context:

-Economic Forecasting and Planning: AI systems can analyze vast amounts of economic data, including GDP growth rates, inflation rates, unemployment figures, and consumer spending patterns, to generate accurate forecasts of future economic trends. These forecasts can help government agencies and policymakers anticipate potential challenges and opportunities, allowing them to develop proactive strategies for economic planning and resource allocation.

-Budget Allocation and Resource Optimization: AI decision systems can assist government agencies in optimizing budget allocations and resource utilization across various sectors and programs. By analyzing historical spending patterns, demographic trends, and policy objectives, these systems can recommend optimal budgetary allocations to maximize the impact of public spending and achieve desired socioeconomic outcomes.

-Taxation and Revenue Management: AI-powered tax administration systems can improve tax compliance, revenue collection, and enforcement efforts by identifying tax evasion patterns, detecting fraudulent activities, and optimizing tax auditing processes. These systems can also provide personalized tax recommendations and guidance to taxpayers, enhancing overall tax administration efficiency and effectiveness.

-Fiscal Policy Analysis and Simulation: AI decision systems can simulate the potential impact of different fiscal policies, such as tax reforms, stimulus measures, or budget cuts, on the overall economy. By analyzing complex economic models and scenario simulations, these systems can help policymakers assess the potential risks and benefits of proposed policy changes before implementation, enabling data-driven decision-making.

-Financial Regulation and Risk Management: AI systems can assist regulatory agencies in monitoring financial markets, detecting systemic risks, and ensuring compliance with regulatory requirements. The AI systems can analyze market data, transaction records, and regulatory filings to identify emerging risks, such as market volatility or financial fraud, and recommend appropriate regulatory interventions to mitigate these risks and maintain financial stability.

-Public Procurement and Contract Management: AI decision systems can optimize public procurement processes by analyzing procurement data, supplier performance metrics, and market dynamics to identify cost-saving opportunities, streamline procurement workflows, and enhance transparency and accountability in government contracting.

It's essential to ensure that these AI systems are transparent, accountable, and ethically deployed to maximize their benefits while minimizing potential risks and biases following EU regulations. AI decision systems for public administration economy control have the potential to change the economic policies of governments. AI systems could optimize resource allocation, and implement evidence-based policies. AI systems developed by public administration could be considered special AI systems. These must be developed and protected because their use benefits all populations.

Some cases of AI tools used in public administration decision-making are the following ones (Ghosh, Ghosh, Lee, & Lee, 2000, Parusheva, Silvia. 2017, Amit Sheth et al. 2016 Cerqueira et Ali. 2015a, 2015b):

1) AI-driven Traffic Management: Case: Singapore's Land Transport Authority (LTA) employs AI algorithms to optimize traffic flow and reduce congestion. The system collects real-time data from sensors, cameras, and GPS devices to predict traffic patterns, adjust signal timings, and manage road networks efficiently.

2) AI-powered Fraud Detection in Taxation: Case: The Australian Taxation Office (ATO) utilizes AI algorithms to detect tax evasion and fraudulent activities. The system analyzes tax returns, financial transactions, and other data sources to identify suspicious patterns and anomalies, enabling targeted enforcement actions.

3) Natural Language Processing for Government Document Analysis: Case: The United States Government Publishing Office (GPO) employs natural language processing (NLP) techniques to analyze and categorize legislative documents, regulations, and public records. NLP algorithms extract key information, identify relevant topics, and facilitate document retrieval and access.

4) AI-assisted Policy Simulation and Analysis: Case: The World Bank utilizes AI-powered simulation models to assess the potential impact of policy interventions on economic development, poverty reduction, and social welfare. These models simulate various scenarios, analyze key indicators, and inform decision-making processes at the national and international levels

5) Case: AI-Powered Crime Prediction in Rio de Janeiro. Description: In Rio de Janeiro, Brazil, the state government implemented an AI system called "CompStat" (Computer Statistics) to predict and prevent crime. The system utilizes machine learning algorithms to analyze historical crime data, socioeconomic factors, and environmental conditions to identify high-risk areas and potential crime hotspots. Law enforcement agencies use these insights to deploy resources proactively and implement targeted interventions, such as increased police patrols or community outreach programs, to prevent criminal activities.

Public Administration AI decision system is the Economic decision system support is a special case. AI decision systems refer to the use of artificial intelligence technologies to optimize economic management and decision-making processes within government institutions. These AI systems leverage data analytics, and machine learning, to analyze economic data, forecast trends, and recommend policies or interventions to support economic growth, stability, and efficiency.

The public administration uses Customer Relationship Management (CRM) systems that analyze customer data, interactions, and purchasing behavior to personalize marketing campaigns, recommend products or services, and forecast sales opportunities by influencer claims on social sites of rewards they earned using that system. (Lourenço 2023)

In the Research and Case Management AI-powered tools for legal platforms analyze legal documents, court rulings, and precedents to support lawyers in legal research, case analysis, and decision-making. These systems can identify relevant case law, highlight arguments, and predict the outcomes of legal disputes based on historical data. In Public Administration in time response gaps, AI could be valuable in increasing efficiency and reducing the gap between analysis and developing decisions. (Neumann, Guirguis and Steiner 2024, Veronesi, Altanlar, Sarto and Kirkpatrick 2022)

The human-centric IP system will be reduced to a corporation and public administration-centric system. Future generation inventors should depend more and more on AI or data science technologies. So there is a problem social or ethical.

Should be allowed AI (or data science) dominance in intellectual property in which the whole system will be not human-related? Will this system oriented to human behavior or to protect a virtual economic organization based on great information owners corporations?

It does not mean that the AI system tool used in public administration is fair and will benefit all. It is only a tool that speeds up the efficiency. AI systems use public information and copyrights too, so that the final result is not a duplicate or some copy of related works. While patents are difficult to find, it is clear when reflecting on the main causes of copyright manipulations of famous authors of literature, painters, and songs.

The AI system supports decisions that conflict with the Property Rights registration of all AI as intellectual products. An attribution of the property of the outcome could be solved if there is a transparent and trusted step-by-step explanation of the process that makes the result possible. The European AI Regulation tries to avoid risks for the public; thus the AI applications must be controlled somehow even if public administration is not obliged to submit AI system uses to authorities because it implies that public administration will follow a protective approach for public and personal information using other regulations.

There is a difference between mechanical or automated and intelligent support to perform a task like making a decision when is not done with a human assistant. It is a dramatic risk to support something not as transparent as could be the human work. The same discussion arises when the outcome results from a process where AI systems and humans are involved in the decision process when AI systems use human input or the opposite.

## 5. Concluding Remarks

The AI systems in making decisions in Public Administration increase have huge impacts on the IP system of the right system, and it must be transparent both as a developing tool or as part of the creative process of innovation. Moreover, AI impacts are not only economics and confined to rights because AI use is wide and impacts social and human behavior. It is necessary to think about a different AI IP registration.

AI system tools to support a decision-making process have a consolidated practice. The outcomes of AI tools are registered by individuals, corporations, or public administration organizations as patents, industrial secrets, or software programs. However, in the consolidated practice of the IP system, many definitions of AI-generated systems are not covered today. AI decision system tool for Public Administration is a new IP rights case.

The paper clarifies the relations between AI systems and IP rights systems in the decision-making area, especially for Public Administration, and produces a summary of the canvas of characteristics, issues, and conflicts that define the framework of property rights and a decision-supporting tool of private and public administration decisions.

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