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À PROPOS DE NOUS

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ABOUT US

The **International Journal of Digital and Data Law / Revue Internationale de droit des données et du numérique (RIDDN)** is an academic journal created and edited by Irène Bouhadana and William Gilles at IMODEV, the Institut du monde et du développement pour la bonne gouvernance publique.

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IMODEV regularly organizes conferences and symposiums on these topics, and in particular every year in November the Academic days on open government and digital issues, whose sessions are published online [ISSN: 2553-6931].

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ARTIFICIAL INTELLIGENCE, THREATS, CHALLENGES AND OPPORTUNITIES PROMETEA, THE FIRST PREDICTIVE ARTIFICIAL INTELLIGENCE AT THE SERVICE OF JUSTICE IS ARGENTINIAN

by **Juan GUSTAVO CORVALÁN**, Administrative and Tax Litigation Judge of the Autonomous City of Buenos Aires. Currently serves as Deputy Attorney General in Contentious Administrative and Tax before the Superior Court of Justice of the Autonomous City of Buenos Aires¹.

Towards the end of this second decade of the XXI century, technological advances are transforming science fiction into reality. Until a few years ago, it was utopian for the following questions to become a challenge for the legal systems: Who's responsible for the consequences of intelligent machine functioning (autonomous vehicles, amongst others)? How can we guarantee the human auto-determination in the artificial intelligence era? How is it possible to “program” the artificial intelligence in order to be able to include a legal and ethical approach? Is it feasible to consider the access to artificial intelligence as a right? How can we avoid artificial intelligence from worsening the inequalities between people? The answers to these questions demand a transcendent effort to rethink and innovate about the challenges of the new revolution that new that we are going through.

During the last three centuries, three major industrial revolutions are usually mentioned. The first one related to the development of railroads and the steam engine in order to mechanize production. The second one related to electrical energy and the assembly line to develop mass production. The third revolution revolves around the emergence of electronics computers and the information technology to automate production². We are currently undergoing a new revolution that is linked to several phenomena (nanotechnology, biotechnology, robotics, internet of things, 3D printing)³. The most disruptive phenomenon is the development of artificial intelligence

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² See KL. SCHWAB,, *The Fourth Industrial Revolution* pp. 20-12, Debate, Barcelona, 2016, pp. 20-12.

³ Regarding the influence of some of these technologies in society, see K. MICHIO, *The Physics of the Future*, Debate, Buenos Aires, 2012.

(hereinafter also AI), that is presented as an innovation connected to the technological advances pertaining to information and data processing (also in this area there are other inventions from the last century such as computers, internet, the world wide web – www- search engines, and others that can be mentioned). The epicenter of the “Fourth Industrial Revolution”⁴ is the exponential increase of two factors; the storage capacity and processing speed of the information and data.

To get an idea, it is now possible to measure the flow generated from the use of information and communication technologies main tools, in real time and on a global scale. For example, on May 29th 2017, 458.090 thousand *tweets* were sent, 63.980 thousand pictures were posted to *Instagram*, 3.629.947 million searches on *Google* were made, and the web processed 2,702.994 *Gigabytes*⁵. This massive volume of data and information cannot be efficiently processed by human beings. Therefore, artificial intelligence is the revolution of revolutions. Its current and potential development is due to the fact that it manages to equal or widely surpass certain cognitive capacities, by processing data and information more efficiently in increasingly more human activities.

§ 1 – ARTIFICIAL INTELLIGENCE: THE REVOLUTION OF REVOLUTIONS

Although we might not be aware of it, we are undergoing an unprecedented era in human history. Among many other reasons, this is because we are witnessing the progressive elimination comprehension of language comprehension barriers almost instantaneously, from the exponential development of the system of artificial intelligence used by the Google translator uses. The famous artificial intelligence translator is one among several artificial intelligence systems that process natural language. In essence, it uses a learning method associated to a vast number of related cases; that is to say, it is not based on learning or applying the grammatical rules of each language. Simply put, it creates giant databases linked to common translations; which are supported by documents translated from one language to another, using documents translated by the United Nations Organization (UNO) into

⁴The World Economic Forum and the International Labour Organization (ILO), highlight that the world is going through the Fourth Industrial Revolution. See «The Future of Work Centenary Incentive. Informative Note. International Labour Office, p.2, 2015 and, The Future of Jobs. Employment Skills and Workforce Strategy for the Fourth Industrial Revolution. », World Economic Forum, Global Challenge Insight Report, January 2016, p. 1, [<https://www.weforum.org/reports/the-future-of-jobs>]; See KL. SCHWAB, *The Fourth Industrial Revolution* pp. 20-12, Debate, Barcelona, 2016, pp. 20-12.

⁵ See «Internet Live Stats» [<http://www.internetlivestats.com/one-second/#instagram-band>] consulted on: May 5th 2017.

different languages. By the end of 2016, the Google translator almost matched up to 500 expert human translators. Let us see more closely the operation of this AI system.

The Google translator test consisted of using a scale from 0 to 6 to score translation fluency of 500 sentences taken from Wikipedia or the news. For English to Spanish translations, Google's new system obtained an average score of 5.43, very close to the 5.55 obtained by the 500 human translators. If you have not tried the translator for a long time, it is probably due to the fact that it presented several mistakes before. In Google's testing, human beings graded the new system between a 64% to an 87% better than the previous version.

That is to say, instead of learning concepts or grammar, the algorithms establish their own ways of breaking down texts into smaller fragments, which normally seem to lack any sense and generally don't correspond to speaking phonemes. And not to mention the speed at which the sophisticated AI system works. One of its designers stated: "It might seem disconcerting, but we have tested it on several sites and it simply works"⁶.

However, the understanding of a phenomenon like this requires briefly addressing the concept of human intelligence with which cognitive science experts work. Let's see.

Among several definitions and conceptions of the intelligence concept, the common element is the *capacity to process information in order to solve problems so as to reach objectives*⁷. The notion of intelligence is indissolubly connected to information processing. It is important to clarify that we speak of information in a broad sense and as per the approach of the cognitive sciences, which allude information processing or the information flow of the environment that is codified, organized, selected, stored and retrieved through the sensory, perceptive systems, among others. Human intelligence is related to a relatively autonomous set of capacities or cognitive qualities that are often classified in "intelligence profiles" or "multiple intelligences". These are: social intelligence, linguistics (or musical) intelligence, logical-mathematical intelligence, interpersonal intelligence, and intra-personal or emotional, fluid intelligence among others.

Basically, our brain controls the ability to process information from the environment and our own body⁸ that is used to evaluate and choose future courses of action. And here come

⁶ See T. SIMONITE, «Google Translates English Into Spanish Almost as well as a Human Expert», MIT, Technology Review, October 4th 2016, [https://www.technologyreview.es/s/6342/google-ya-traduce-de-ingles-espanol-casi-tan-bien-como-un-experto-humano consulted on 08/20/2017].

⁷ About all these issues: H. GARDNER, , *Intelligence Reframed*, Paidós, Madrid, 2010, pp. 52 and subsequent sections (especially p. 115); H. GARDNER,., *Five Minds for the Future*, Buenos Aires, 2013, p. 17. Also see: FONDO DE CULTURA ECONOMICA, *The Theory of Multiple Intelligences*, México, Dictionary of Cognitive Sciences, 1987, p. XXIII; MANES, FACUNDO, et al, *The Argentinian Brain*, Planeta Buenos Aires, 2016, pp. 269-270, 274, 275 and 301; F. MANES, , et al, *Using the Brain*, pp. 115 and 130.

⁸ As per a biological point of view, the DNA is the essential carrier of genetic information. See M. GERARD, , et al, *The Biology Book*, Ilus Books, Madrid, 2015, p. 354.

the decision-making process and evaluation, which consists of *selecting, cutting and organizing the available information*.

Based on human intelligence, multiple and diverse technological innovations have been developed. We will be dealing here, with information processing for problem solving and making decisions based on machines operating with the referenced intelligent algorithms. AI is substantiated by intelligent algorithms or learning algorithms that, among other aims, are used to identify economical tendencies, predict crimes, diagnose disease, foresee our own digital behavior and so on. An algorithm can be defined as a precise group of instructions or rules, or as a methodical series of steps that can be used to make calculations, solve problems and make decisions. The algorithm is the formula used to make a calculation⁹.

Now then, during the last decades, different methods to develop algorithms using large volumes of data and information have been employed (some of these methods are: neural networks, genetic algorithms, reinforcement learning, amongst others). In essence, it is sought, through AI implementations, for technologies to allow the computing systems to acquire: self-reliance, self-adaptive reconfiguration, intelligent negotiation, cooperative behavior, survival with reduces human intervention¹⁰, among other features. All this implies the use of different techniques that are based on the recognition of patterns in order to solve problems¹¹, maximize objectives and optimize information processing. Let's see another example understand how the most successful AI systems work.

In 2011, the artificial development developed by IBM named "Watson", competed against human beings on a game of *Jeopardy*. This United States television contest based on answering questions about numerous subjects such as history, languages, literature, among others, and lies in that each of the three contestants choose one of the game board panels that, when uncovered, reveals a clue in the form of a response. The contestants have to give their answers in the form of a question. For example, some of the questions are formulated as follows: "It could mean a gradual mental development or something that is carried during pregnancy" or "A long and tedious speech written in the trivial cake dressing."

Ken Jennings is the supreme game winner (74 times in one year). In February 2011, Watson competed against him and another champion, *Brad Rutter*. Watson won the game, and it did so because, in essence, it can process more data and faster than the human contestants. While AI considers millions of possible hypotheses at the same time, it will take several centuries for a

⁹ See P. DOMINGOS, *The Master Algorithm: Hot the Quest for the Ultimate Learning Machine Will Remake Our Worlds*, Basic Books, New York, 2015, ps. XVI, 1 and subsequent sections.

¹⁰ See, J. BARRAT, *Our Final Invention*, 2013, pp. 205-206.

¹¹ See more; G., A. SERRANO, *Artificial Intelligence*, RC, Madrid, 2016, pp. 5 and 9.

human being to analyze all the deliberations that Watson in three seconds. Let's see some figures that reflect the data and information magnitude that this AI processes. Watson was able to process 200 million pages coming from documents, including entire encyclopedias, which include Wikipedia and natural language full of ambiguities and vagueness (we are talking about one thousand books *per second*). The system it uses also includes a subsystem that helps to calculate the degree of reliance in the response that the AI will ultimately provide. Simply put, Watson has an assistant. Intelligent algorithms managed by another algorithm that functions as an expert consultant. We are witnessing the creation of another character which is added to the classic investigating pair: Sherlock (IBM), Watson, and its expert algorithm consultant.

As this artificial intelligence has read hundreds of a million informative pages that include stories, it is able to follow the thread through complicated sequences of events. Watson optimizes information from hierarchical statistical processes, learns from its experiences and at a speed impossible to overcome by a biological organism. But the most relevant is that of the acquired knowledge comes from itself and from all the information it obtains, beyond the few other areas of the data that were programmed to this AI directly by human beings¹².

The Google translator and Watson are two examples among many others that exemplify the artificial intelligence tsunami that is being developed in multiple fields. These are systems that create music, paint pictures, recognize faces, objects, predict successful companies in the stock market, detect diseases, and help to protect the environment, among many others. We are witnessing a real race to develop AI to simplify and optimize various human activities. It is in this scenario that three main challenges arise within the legal field. On the one hand, how do we protect ourselves from the intelligent algorithms that are replacing and surpassing us in multiple activities. On the other hand, how do we make this new technology contribute to sustainable and inclusive development of human beings? Lastly, how will human rights be protected and transformed in a transition that seems to be directed towards symbioses between the biological, digital and artificial.

In this first approach, all these issues could be redirected from exploring two main axes. The first one, related to what can be referred as “the luminous side of artificial intelligence.” Here, this technology is drastically disruptive to enforce certain rights and, at the same time, represents a qualitative lead leap on the ways organizations and their relationship with citizens shall be managed.

¹² About this subject; J. BARRAT, *Our Final Invention*, 2013, pp. 244-251. It is important to denote that Watson uses a system called UIMA (Unstructured Information Management Architecture) that acts as an expert agent that intelligently combines the results given by independent systems.

The second axis is related to what we refer to as “the dark side of AI”. From this perspective, it is important to highlight the risks that are generated from the so-called existential risk associated to the possibility that human beings may lose control over artificial intelligence. But leaving this extremely complex issue that is projected in the medium and long term aside, other aspects related to the short term must be addressed. For example, issues related to the impact produced on the fundamental rights of human beings by the development and use of AI systems. A few brief proposals will be highlighted in the following points.

§ 2 – ASYMMETRICAL DEVELOPMENT AND NEW TECHNOLOGIES

Many times, we tend to refer to asymmetrical development which usually is inherent to fewer advantages countries. In the technological sphere, the presence of this phenomenon accounts for various asymmetries within its development. For example, in the Autonomous City of Buenos Aires there is an entire digital Public Administration (in addition to this, more than 58e regulations which regulate the Public Administration’s digitalization have been issued), while in other provinces this process has not even started. This situation also occurs on a much deeper level. Currently, 17% of the world’s population, 1.300 millions of people, does not have access to the benefits from the second industrial revolution (electricity). And, more than half of the world populations, 4,000 millions of people are still not connected to the internet¹³.

In asymmetries within development are normally accompanied by the need for protection and rights effectiveness which are also dissimilar. That is to say that the challenges regarding first necessity issues must be faced (as water access, essential services, and so on), but also it is important to make progress in protecting other massive rights violations in the digital world. Even so, we often consider that as it is difficult to solve certain urgent problems, it would be illogical to try to address others. However, it is important to think and act conversely. Taking care of basic issues, it is also important to undertake the new challenges; if not, the spectrum of right violation increases. For example, in the criminal field there are several challenges that are very complex to be addressed (such as drug trafficking, illegal sales, and armed robbery, among others). But at the same time, the digital world entails other challenges and new rights to be protected appear. We are referring to all the issued related to cybercrime (such as cyberbullying, child pornography, grooming,

¹³ See KL. SCHWAB, *The Fourth Industrial Revolution* pp. 20-12, Debate, Barcelona, 2016, p. 21.

computer fraud, and others). A citizen must also be protected from these violations to their rights.

In short, asymmetrical development increases the complexity and demands for major efforts in order to make effective the rights of the people. In Latin America in general, and in Argentina in particular, there are multiple differences among the people, the districts, and vulnerable areas. On the one hand, the digital divide¹⁴ that exists among citizens that are connected through the internet and those that are not, must be considered. On the other hand, the organization and public authorities' development are asymmetrical in terms of infrastructure and development. However, this does not stop the State from improving on several matters at the same time and to accelerate the transition to adapt to this new space and time revolution.

On the contrary, the more time it takes, the citizen is the one who "loses". For example, the multiple internet and social media problems (all issues related to cybercrime and privacy) have been affecting people that are connected for a long time now, no matter if they live in different Argentinian provinces (Formosa, Tierra del Fuego, or others), in Brazil, in France or in Italy. Something similar occurs with the implementation of the electronic or digital case file. When Administrations save days with physical transfers and in diverse paper related aspects, the time "won" is the same for a citizen from an Argentinian southern province (as Neuquén) in regards to another from the north (as Salta). In conclusion, we shall advance in innovations favoring inclusion (innovative inclusion), beyond the existence of an asymmetrical development. And here artificial intelligence comes to play as an instrument at the service of justice and rights.

In a broad sense, this approach is related to a new technological that is called intelligence at the interface. From this optic, the interface¹⁵ possesses a lot of information about the user, it understands it in context, it is proactive and it improved with experience. To understand it better, let's see how correlations develop in the digital world. On the one hand, there is a system by which the user chooses the path and technology that connects

¹⁴ 'Digital divide' is the "separation that exists among people (communities, States, countries) that use ICTs as a routine on their daily lives and those that lack of access to the same and even if they did have, they do not know how to use them." See A. SERRANO, et al, *The Digital Divide, Myths and Facts*, UABC, Baja California, 2003, p. 8. Available at labrechadigital.org. In this sense, the Inter-America Commission on Human Rights acknowledges that, considering universal access principle "increase the access and close the digital divide is related to the need that the State make sure that the private actors do not impose disproportionate or arbitrary barriers to access internet or use the main services." See: OAS, Freedom of expression and the Internet, Annual Report 2013 - Report of the Office of the Special Rapporteur for Freedom of Expression, chapter IV, OEA/Ser.L/V.II.149, Doc. 50, December 31st 2013, paragraph 17.

¹⁵ In terms of websites, the interface is the group of elements on the screen that allows the user to perform actions on the website that is being visited. That is why, the identification, navigation, content and action elements are considered part of the interface.

the dots, as it happens with hyperlinks. On the other hand, is the so-called “portal”, where the user chooses one channel and the technology transmits its content. Thirdly, we find one of the most used, which refers to search engines (the most famous is Google). Here the user establishes what he wants to search for and the technology finds the relevant and quality content in return.

Lastly, there is a more efficient method: the intelligence at the interface. Here, the user simply interacts (talking or chatting as if it was *WhatsApp*) and the technology solves the problems through connections with different systems that can answer the user’s needs based on learning¹⁶. In the case of iPhone cell phones, Apple has developed a voice assistant named *Siri*. When activated, it can be asked several questions, it replies and can also schedule a meeting on your calendar if you just ask it to do so. This is also the case of *Prometea*, the intelligence that we have developed at the Public Prosecutor's Office, which is located within this new paradigm. According to our investigations, the intelligence at the interface – through artificial intelligence systems- may have a decisive impact in the reassurance of certain access rights, and even more when it is the case of vulnerable or disabled individuals. Let’s see this specifically.

§ 3 – PROMETEA, THE FIRST PREDICTIVE ARTIFICIAL INTELLIGENCE AT THE SERVICE OF JUSTICE IS ARGENTINIAN

Since we undertook the Public Prosecutor’s Office of the City of Buenos Aires management, and thanks to the support of Luis Cevasco, Deputy Attorney General in charge of the Public Prosecutor’s Office of the City of Buenos Aires, we have been strongly working on new technologies. Particularly, focusing on information and communication technologies (ICTs). During the course of 2017, we have developed the first predictive artificial intelligence system¹⁷ that also works with a voice assistant (as Apple’s *Siri*) and allows the confection of a Legal Opinion in full.

The predictive model is amazing, unprecedented and recent (it has one week). The procedure is entirely managed by AI, as follows: a case file that has not been analyzed by any human being arrives in order to pass an opinion on this file. The case file

¹⁶ Regarding interface intelligence, see; T. GRUBER, «Intelligence at the Interface: Semantic Technology and the Consumer Internet Experience», May 2008, [<http://tomgruber.org/writing/semtech08.pdf>]; T. GRUBER, «Collaborative Knowledge Management - Intraspect», May 2008, [<http://tomgruber.org/technology/intraspect.htm>].

¹⁷ It is important to mention the support of Daniel Pastor and the Instituto de Neurociencias y Derecho (INEDE) have provided to us. The Institute and its work team are innovators on the neuroscience sphere applied to Criminal Law. In fact, they have created a software that estimates delivery time on criminal matters prescriptions.

number is recorded on the artificial intelligence, Prometea, and in a matter of seconds, everything details below happens. The AI system searched for the title of the case in the Superior Court of Justice of the City of Buenos Aires' website, it associates it with another number (linked to the main proceedings) and then heads to the Judiciary website of the Autonomous City of Buenos Aires (Juscaba). It searches and reads First and Second Instance ruling, and it then it analyzes more than 1.400 Legal Opinions (issued during 2016 and 2017) to finally issue a prediction. In short, it detects a specific model to solve the case file, and offers the possibility of completing a few facts so as to print or to send the Legal Opinion to be revised based on that model (the same could be done in order to render a sentence). During the month of October, we will be working on validating the predictive system (which implies measuring the time reduction among other things) beyond these first samples, Prometea's accuracy is amazing. Even, a case file that arrived at the Public Prosecutor's Office that had already been pre-classified by a member of our team about one subject, in a few seconds, Prometea suggested the application of another judgment model related to another different subject, and precisely the latter was the correct one.

But even before we were able to develop this predictive system which (according to our investigations) is unprecedented, we had already implemented artificial intelligence using a virtual assistant modality (application of intelligence at the interface). We have been working on a pilot test for several months with different case files, where the person that opens it (they are not digitalized yet), and once they are ready to draft a model, they activate Prometea by a voice command on a cell phone (mobile device) or by chat, as if you were to have a conversation through *Whats.App*). The entire process is done by means of artificial intelligence. From a 'hello', to several questions and answers between Prometea and the individual, which includes searching and "bringing" laws and decrees to the Legal Opinion, until we get to the point (depending on the model we are working on) where Prometea tells us that the 'Legal Opinion is complete'. Then, we can order it to 'print', 'download' or to send the draft by email or to an internal network, so as to be corrected.

If performed by voice command, the entire process is completed without touching the keyboard or the mouse. When we turn on the computer and activate Prometea, it asks us to inform the case file number, and then it obtains the case file title from the official website of the Superior Court of Justice of the Autonomous City of Buenos Aires, and it offers a model of the Public Prosecutor's Office with a complete case file title and the subject according to what we express. For example, a citation model, a housing model, and/or a self-sufficiency model. It also notifies if the Legal Opinion model is not applicable,

because the deadlines have expired or due to the lack of formal requirements.

In order to avoid any failure, as we are in the experimental phase, the models executed by Prometea, before they are sent to be signed, are checked by the team that works at the Public Prosecutor's Office. By the end of the year, we aspire to pass judgment on at least one half of the case files that arrive to the Public Prosecutor's Office¹⁸ by using Prometea.

However, this innovation that takes place in the public sphere implies a qualitative development in regards to speed and precision in our daily work to provide a better justice service. The tests we have performed on more than 40 case files demonstrate that Prometea is between a 200% and a 288% more efficient, depending of the model being considered. Also, these figures will increase even more when the predictive model is fully operational.

§ 4 – ARTIFICIAL INTELLIGENCE AT THE SERVICE OF ACCESS RIGHTS

The most important aspect we noticed when developing Prometea, is linked to its extension into other areas. Simplifying the interaction with a prosecutor, organize internal judicial processes, optimize citizenry-State relationships and, above all, to focus its use in vulnerable areas and individuals with disabilities. Here is where the luminous side of the AI becomes evident. That is, that artificial intelligence can be a key tool in the citizenry-State relationship. A system like the one we developed in the system like the one we developed in the Prosecutor's Office could be applied to multiple procedures and services within the Administration or as a bridge to radically simplify the logic of many access rights. The State's procedures or services could be provided through digital voice assistance or through *chatbots*¹⁹. In fact, if you have an iPhone and enable the Siri function, try calling 911 just by requesting it and the assistant will do so. Even with this technology, it is much simpler to guarantee the centrality of the user through a unique or digital²⁰ portal.

¹⁸ During 2016, without considering the case files associated with criminal matters, the Public Prosecutor's Office on Contentious Administrative and Tax Matters passed 912 Legal Opinions, as per *Recurso de Queja* (type of appeal filed when a lower court judge improperly refuses to permit or delays the filing of an appeal), *Recurso de Inconstitucionalidad* (appeal filled to request the reversal of a judgment that violated the constitution) and ordinary appeals entered to the Superior Court of Justice of the City of Buenos Aires.

¹⁹ A chatbot is a conversation agent that interacts with users, at a determined domain or about a determined subject using natural language. See J. HUANG, et al, *Extracting Chatbot Knowledge from Online Discussion Forums*, International Joint Conference on Artificial Intelligence, California, 2007, vol. 7, pp. 423-428.

²⁰ The digital platform is formed by the internet portals and mobile applications; process guide; the citizen digital profile; call center services; public office for in-person service; simple text message services (SMS) and services offered through social media. See Argentina National Executive Power, National Public Digital Area Platform, Decree

In turn, the use of artificial intelligence could optimize the data and information flow available for public (and private) organizations in order to solve issues that before used to require multiple steps, procedures and phases that could not even be resolved.

Although it exceeds this article to keep extending on all these issues, this type of technology, at the service of rights, becomes a right itself. Even more so, if we consider that the Argentinian Digital Law No. 27.078 (Sections 1 and 2) declares the development of information technologies and communication (ICTs) of public interest; and speaks of ensuring the human rights to communications, telecommunications and, also, the access to ITCs services.

§ 5 – THREATS AND CHALLENGES, PROTECTIC HUMAN RIGHTS IN THE ERA OF INTELLIGENT ALGORITHMS

All technological innovation produces benefits, risks and damages. Among other advantages, the Internet is vital to ensure the right to freedom of expression, but, for example, it is also used for arms and organ-trafficking, as well as many other crimes that take place in the digital world. Taking this aspect into account, in the two previous points we have addressed the luminous die of artificial intelligence. Now, we will trace a few lines about the risks, challenges and treats that this new technology has for us. The “dark side of AI.”

Earlier this year, more than two thousand five hundred experts (Stephen Hawking amongst them) established the following principle:

“Risks posed by AI systems, especially catastrophic or existential risks, must be subject to planning and mitigation efforts, commensurate with their expected impact. And, to a greater extent it shall be subject to strict security and control measures²¹”.

Currently, there are multiple challenges to ensure the compatibility of artificial intelligence development with the State’s domestic law and with existing international law. Intelligent algorithms are used to capture all our data, recommend us what to search for, where to go, what to do, how to get to a determined place faster, diagnose diseases, prevent them and so on. All these issues require specifying certain aspects that have to be taken into account.

Firstly, it is fundamental to know how this technology works. An adequate regulation cannot be thought without knowing the

87/2017, section 1, February 2nd 2017; Argentina National Executive Power, State Modernization Plan, Decree 434/2016, section 1, March 1st 2016.

²¹ See «Asilomar AI Principles», Future of Life Institute, [<https://futureoflife.org/ai-principles/>].

dynamic of the object to be regulated. Something similar occurs with legislation regarding food, medication, amongst others. In this aspect, as the AI systems develop exponentially, it is essential to be constantly updated with the new methods used.

Secondly, develop it is fundamental to analyze certain areas and rights in a particularized manner. It is different the assumption in which the AI systems recommend and manage our musical preferences in our Spotify account (or which videos I would like on YouTube), and another different assumption is the way in which intelligent algorithms predict if I will have an illness or if a restrained individual shall be granted probation.

Thirdly, when it comes to fundamental rights, it is essential to consider an outstanding aspect of all the most sophisticated systems or artificial intelligence used nowadays (Watson of IBM, Alex, Quid, Siri, among others). It is about authentic black boxes. In essence, this means that algorithms cannot offer a detailed explanation on how they reach a certain result. That is, it cannot be established how the AI system evaluates and analyzes the data and the information that it processes. That is why it is referred to “black boxes”. Computational tools in which one understands the entered data and results, but cannot comprehend the subjacent procedure, is called a black box system. Here, the code is inscrutable because the program “evolves” and human beings cannot understand the process that the programming followed in order to achieve a certain solution²².

In fourth place, considering the above principles, it is indispensable to assure the equity and no discrimination principles when facing artificial intelligence predictions regarding fundamental rights. For example, certain predictive AI used in the United States of America, are based on a source code that considers race, gender, among others. And this provokes an inadmissible case of structural algorithm discrimination. In the case “State vs. Loomis”²³ the appellant sustained that the intelligent algorithm used the gender evaluations incorrectly²⁴.

Let’s consider this issue in detail. The independent news agency ProPublica, held an investigation on the reliability of the prediction of recidivism by using intelligent algorithms within the criminal scope. Basically, it analyzed the way COMPASS²⁵

²² See J. BARRAT, , *Our Final Invention*, 2013, p. 92.

²³ See Wisconsin Supreme Court, July 13th 2016, *Wisconsin State vs. Eric L. Loomis*, [<https://www.wicourts.gov/sc/opinion/DisplayDocument.pdf?content=pdf&seqNo=171690>].

²⁴ See Wisconsin Supreme Court, July 13th 2016, *Wisconsin State vs. Eric L. Loomis*, whereas 17, 28, 34, 51, 93 and 94. [<https://www.wicourts.gov/sc/opinion/DisplayDocument.pdf?content=pdf&seqNo=171690>].

²⁵ In the United States of America, the most widely used artificial intelligence system that sets a risk score is COMPAS. This AI is based of risk assessment in the field of insurance to determine the accident risk of a particular person and what premium will correspond to pay. COMPAS provides a risk scoring response on a scale of 1 (low risk) to 10 (high risk). That is, the score that artificial intelligence provides is a comparison of how

works. Risk scoring was assigned to more than 7,000 individuals under arrest in Broward County, Florida, that were assessed between 2013 and 2014, and it determined how many were subsequently charged with new offenses over the next two years. The scoring turned out to be remarkably unreliable in predicting violent crimes, as only twenty percent (20%) of the individuals predicted to commit violent crimes actually committed them²⁶.

In contrast, when the total number of offenses including minor offenses - such as driving with an expired license - was taken into account, the prediction proved to be more accurate. In this case, the success rate of those who actually was sixty-one percent (61%). In addition, they detected a higher recidivism prediction rate in African American offenders and a greater number of false positives (that is, incorrect recidivism predictions) in this group of offenders. This compared to the results obtained and corroborated in the predictions regarding individuals of a Caucasian ethnicity. In addition, white defendants were poorly labeled as low risk, more often than African American defendants.

ProPublica researchers wondered whether this disparity could be explained by the previous crimes of the accused individuals or the type of crimes for which they were arrested. The answer was negative. Thus, through a statistical test that isolated the ethnicity effect of criminal history and recidivism, as well as the age range and gender of the accused, it was shown that African American defendants still had seventy-seven percent (77%) more possibilities of being linked to a greater risk of committing a future violent crime and forty-five percent (45%) more possibilities to be expected to commit a future crime of any kind. Even, as in the best style of the Greek oracle Calcante, it was concluded that the developers of COMPAS (Northpointe company) do not publicly reveal which calculations are used to reach the defendant's risk scores, so it is not possible for the

risky the individual is in relation to a segmented population. For example, if a score of 4 is obtained, then 60% of the population is seen as riskier than the subject analyzed, while 30% appear less risky. The scoring that corresponds to assign to an individual in particular, evaluates and assigns weight to a series of criminogenic factors (causes or concauses of criminality) that are present in the subject in relation to a population with similar characteristics. For example, if we use the COMPAS system to gain scoring, it would assign a lot of weight to the age at which our subject committed its first offense, education level and previous history of noncompliance, among others. Thus, if the person seeking parole was 25 years old and the first offense was committed at the age of 16, the risk score for reoccurrence would be of high risk; that is, located on the scale at a score higher than or equal to 8 points. On the contrary, the older the offender, the lower the score, even if he committed a felony. See more; Northpointe, Practitioners Guide to COMPAS.

²⁶ See J. ANGIN, et al. «Machine Bias: There's Software Used Across the Country to Predict Future Criminals. And it's Biased Against Blacks.», ProPublica, May 2016 [<https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing>].

accused – nor to the public – to see what could be causing the disparity²⁷.

These “artificial oracles” also do not seem to offer an intelligible explanation – in human language – regarding how the factors are weighted or analyzed to reach the percentages. Imagine the reader who is discussing with an individual whether or not he owes the sum of twenty thousand pesos (\$20.000) and goes to court. Suppose the judge rules that he owes nothing, because he analyzed several factors. But he does not express how he evaluated them. Undoubtedly, we would be faced with a typical case or arbitrary judgment. So if intelligent algorithms are used to help criminal judges decide on conditional release/parole, our constitutional and conventional system impedes using such a system. In fact, it is not only a question of ensuring that the system is not based on distinctions of race, gender, or others, but also that the AI must be able to explain in a language understandable to humans, which factors it uses and how it analyzes the elements that sustain them²⁸. For these reasons, artificial intelligence cannot be applied in these fields today. Hence, the importance of the movement called “Explainable Artificial Intelligence”. Otherwise, it is difficult that in the face of such opaque systems, the massive development of autonomous vehicles, “artificial oracles” that predict health, safety, and everything related to war weapons by the State matters, be admitted.

In fifth place, those who develop AI often rely on trade secret protection and in patent rights. And while this is a reasonable at first, when it comes to AI systems linked to commercial matters (online sales, advertising, marketing, or others), it cannot be opposite when it comes to issues related to an individual’s dignity. In this aspect, section 13.2 subsection a) of the American Convention on Human Rights, becomes particularly important when quoting that the right to freedom of expression “shall not be subject to prior censorship but shall be subject to subsequent imposition liability, which shall be expressly fixed by law to the extent necessary to ensure: a. respect for the rights or reputation of other [...]”²⁹.

As we cannot continue to detail each of the issues involved in the development of AI, these brief samples highlight the complexity and difficulty of addressing this innovation. That is why it is crucial to put the issue on the agenda, to think about

²⁷ The developing company publicly replied that the ProPublica report presented technical mistakes. *See* NORTHPOINTE, «Response to ProPublica: demonstrating accuracy equality and predictive parity», [<http://www.equivant.com/blog/response-to-propublica-demonstrating-accuracy-equity-and-%20predictive-parity>].

²⁸ This is not leveled in all legal systems, for example, in the Anglo Saxon system judgments passed by the guilty or non-guilty juries are taken as innovations and their judgments are only appealable when a guilty statement leads to a conviction.

²⁹ Also see: Section 52 of the Civil and Commercial Code of Argentina “The human person injured in his or her personal or family privacy, honor or reputation, image or identity, or that in any way impaired his personal dignity, can claim the prevention and compensation for the damages suffered (...)”.

an international cooperation scheme and, at the same time, to create favorable regulatory. This also implies incorporating guiding principles applicable for artificial intelligence systems that are compatible with our human rights model; that is to say, we strive for AI development that is compatible with the constitutional State and with the international law of Human Rights.

§ 6 – LEGAL PRINCIPLES FOR AND ARTIFICIAL INTELLIGENCE THAT RESPECTS AND PROMOTES THE VALIDITY OF THE CONSTITUTIONAL STATE AND THE EFFECTIVENESS OF FUNDAMENTAL RIGHTS

The “human rights model” is crystallized from a protective paradigm that emerges from international covenants and which is essentially based on human dignity. In this way, the epicenter of the system is based on equality, peace, minority protection, of the most vulnerable or the weakest³⁰. It is a scheme that obliges States and the international community to guarantee the effectiveness of rights, principles, and rules that are embodied in constitutions, international covenants and domestic laws³¹. But a human rights approach linked to new technologies presupposes accepting a starting point: inclusive innovation for sustainable development³².

On this platform, for AI development to be compatible with a “human rights model”, it is important to promote a regulation that incorporates a series of principles that to a great extent are linked to three incipient categories that, by a matter of extension, will be expanded in future publications: algorithmic dignity, algorithmic identity and algorithmic vulnerability. All of them are presented as a derivative of digital dignity (which in turn is integrated into the digital identity) of human-being in the digital world. In essence, it is a question of making the protection system more robust by incorporating a series of general principles into the legality block tending to regulate it. Let us see. *Prevention/precautions*. These principles constitute two different functions, with a common denominator the need to act before any damage production. Radically, they intervene on different types of risks. For potential risks, precautions. For verified risks, prevention³³. The precautionary principle within AI (analogous to what happens in environmental law) is linked with a total lack or absolute scientific certainty about the absence of risks. When artificial intelligence is intended to impact on people’s fundamental (health, freedom, equality, and non-discrimination, security), AI systems could not be used if the following circumstances: i) a closed source code or existence of a system in

³⁰ See L. FERRAJOLI, “About Fundamental Rights, Theory of Neo-constitutionalism”, Trotta, Madrid, 2007, pp.73-75.

³¹ However, as stated by Charles Beitz, it is not plausible to find a unique foundation or to create a list of rights. See C. R. BEITZ, *The Idea of Human Rights*, Marcial Pons, Ediciones Jurídicas y Sociales, Madrid, 2012, pp. 141-142 and 244.

³² From the United Nations Organization point of view: “(...) everyone shall take advantage from the benefits of new technologies, especially from information and communication technologies, as per the suggestion made in the Economic and Social Council’s Ministerial Declaration 2000”. See: United Nations, 55/2 Millennium Declaration, section III, point 20, item five [<http://www.un.org/millennium/declaration/ares552e.htm>].

³³ See L. H. ALLENDE RUBINO, *The Preventive Action in the Civil and Commercial Code. The Relation with the Preventive Measure Principle in the Environmental Right*, MicroJuris online, 2016, quote MJ-DOC-9989-AR and MJ9989.

which one understands the data entered and the results, but the underlying procedure cannot be inferred ('black box'); ii) absence of algorithmic traceability; iii) the inability to assure an 'off button' or a fail-safe mechanism for AI containment; iv) when at any stage - design, development or application - it is noted that the system is based on distinctions that violate the principle of equality and non - discrimination. Here this would operate as a kind of suspicious algorithmic category.

Algorithmic self-determination. Self-determination is a fundamental right derived from the dignity of the human being³⁴. It aims to ensure the "free development of human personality" by recognizing informational self-determination oriented at guaranteeing the right to choose – associates with freedom of information, the 'right to know', 'knowledge and 'information self-regulation'³⁵. On this basis, the States and the international community must responsibly invest and make every effort to ensure human self-determination against the use of intelligent algorithms. As AI increasingly intervenes between data/information and individual's decisions, it is essential to protect their rights by promoting respect for the necessity, purpose, proportionality and personal data ownership principles.

Algorithmic transparency and the impartial validator principle. When AI systems are intended to be used in the field of health, freedom, security or other fundamental rights, the design, development and use of artificial intelligence must ensure that no 'black boxes' are configured, or that architecture failures are checked, when they may cause damage or injuries. That is to say, artificial intelligence must be transparent in its decisions, which means that an 'understandable explanation' about the criteria applied to arrive to a certain conclusion, suggestion or result can be inferred or deduced. This issue has two crucial sides.

In the first place, it is relevant to consider so-called trade secrets, which protects the confidential business information giving companies competitive advantages. This encompasses industrial or manufacturing secrets and trade secrets. The unauthorized use of such information by individuals other than the owner is considered an unfair practice and a trade secret violation. Depending on the legal system and the country, the protection of trade secrets is part of the general concept of protection against unfair competition or is based on specific provisions or court decisions on the protection of confidential information³⁶.

³⁴ See S. RODOTA, *The Right to Have Rights*, Trotta, Madrid, 2014, p. 182.

³⁵ See R. PITCHAS, *Administrative Law of the Information*, Administrative Law Innovation and Reform, Global Law Press, 2^a ed., Sevilla, 2012, pp. 226-227 and 236. This author speaks of a paradigm shift in administrative law of information, where each individual must be able to decide under his own responsibility and autonomy between the possibilities and risks generated by freedom of communication; R. PITCHAS, *Administrative Law of the Information*, Administrative Law Innovation and Reform, Global Law Press, 2^a ed., Sevilla, 2012, p. 236.

³⁶ See «How to protect the commercial secrets of your PYME?» World Intellectual Property Organization, WIPO

In the second place, even if the developer is willing to ‘open’ the system (the source code), in more advanced AI systems, there is no technical way to determine step-by-step (traceability) about how algorithms arrive at the result, decision or prediction. This frequently occurs in one of the most used methods: artificial neural networks³⁷.

Now, so as to address the black box phenomenon, it is important to insist on the fact that AI systems are designed to maximize results and to optimize the information and data processing. However, when individual's fundamental rights (health, life, freedom, privacy, freedom of speech, among others) are at stake, it is fundamental for the systems' intermediate results be validated. This implies that the reasoning or reasoning structures that are followed to arrive at decisions or predictions must undergo three-phase process: 1) verification, 2) validation and 3) evaluation³⁸. Moreover, here quality and transparent of algorithmic process assurance comes into play.

The basic idea is to achieve that the information and data processing systems carried out by IA systems comply with certain quality processes so that the results are the expected ones and are not obtained at any cost. The first stage we referred to is linked to the architecture of the IA (verification). It is about ensuring certain standards or principles such as consistency, completeness, correctness and non-redundancy. Among other methods, it is a question of allowing human experts to stimulate, to the extent possible, the process in order to detect discrepancies.

Here a central factor appears before certain AI that affects or will have a strong impact on fundamental rights of individuals. Those who design, train or develop intelligent algorithms cannot participate in the validation process. We will refer to this as the impartial validator principle. Moreover, it is essential that the public authorities intervene in the process and be legally obliged to do so. This does not mean that all AI systems are subject to this verification and validation process. However, it is important when developing algorithms that affect life, safety, freedom and health of individuals.

Artificial Intelligence traceability. Traceability is the “ability to trace the history, application or location of any entity through recorded indications”³⁹. An AI based on a human rights approach must be able to explain, step by step, the technical operations it performs from the beginning to the end of a given process. As a rule, the intelligibility of the intelligent algorithm decision-making process must be guaranteed.

[http://www.wipo.int/sme/en/ip_business/trade_secrets/trade_secrets.htm].

³⁷ See J. BARRAT, , *Our Final Invention*, 2013, pp. 240-241.

³⁸ See J. T. PALMA MENDEZ, et al, *Artificial Intelligence*, McGraw-Hill Interamericana de España S.L., pp. 891-935.

³⁹ Definition according to ISO 8402, complement of ISO 9000.

Maximum access. The right of access to algorithmic information. When the State and the public non-state individuals, by themselves or through third parties, design, develop or use information or communication technologies based on AI or intelligent algorithms (which involves any type of machine or intelligent robot), they must guarantee the maximum access to the processing system that those technologies perform⁴⁰.

The algorithmic non-discrimination principle. The design and/or implementation of intelligent algorithms should respect the non-discrimination principle, which consists of preventing AI systems from processing information or data under bias or human distinctions, based on race, colour, gender, language, religion, political or other opinions, national or social origin, property, birth or other status (Article 2, subsection 2; Covenant on Economic, Social and Cultural Rights).

FINAL CONSIDERATIONS

Promoting the ‘luminous side of artificial intelligence’, and protecting human rights from the “dark side of the AI”, are presented as the two transcendental challenges of the Fourth Industrial Revolution. The work that awaits us is monumental, since we must do on a par with an asymmetrical development, which places us in front of other problems that have not been resolved for decades.

However, it is essential not to waste time, because otherwise it would be much more dramatic than what happened with the emergence of the internet and the development of Information and Communication Technologies (ICTs) within the United Nations (UN)⁴¹. Thus, while we expanded our possibilities and simplified the environments through digitalization, there were multiple violations of classic and new rights that the legal system could not attend. It is logical for this to happen, since Law, by rule, works in a reactive way. Nevertheless, this technology is different from all and therefore we must be proactive, in trying, to approach the issue from a multidisciplinary, integral, multipolar, flexible and dynamic perspective.

In relation to the protection of individual human rights, it is essential to consider two interrelated aspects. On the one hand,

⁴⁰ The same access must be guaranteed in respect of any human or legal person, public or private, linked to public purposes or public funds received, using such technologies, provided that the design or use of artificial intelligence is related to public purposes or to public funds received.

⁴¹ For example, the UNESCO encourages the creation of an enabling legislative environment in the field of ICTs. In the same line, the UN argues that the development of technologies, research and national innovation must be supported, guaranteeing a normative environment propitious to the industrial diversification and the addition of value to basic products. In addition, States should refrain from using information and communications technology in contravention of international law. See: United Nations, General Assembly, Resolution No. A/71/307, August 5th 2016, whereas 8, p. 4; United Nations, General Assembly, Resolution No. A/RES/70/1, October 21st 2015, whereas 9.b, p. 23; United Nations, General Assembly, Resolution No. A/RES/71/101 A-B, December 23rd 2016, whereas 4, p. 4.4

how to guarantee human intervention against the decisions or predictions of intelligent algorithms, by trying to create systems that value the previously developed principles. On the other hand, if data protection experts are reflecting on human intervention in regards to algorithms⁴², then we must work on the following question: how much human intervention is necessary so that information processing and AI data system results are legit, respectful and promote the effectiveness of human rights.

Prospectively, we believe that certain challenges presented by AI have to do with our identity as species. If human beings are characterized by diversity, randomness and imperfection, we are entering an era of automation that could put those features in crisis. Although it sounds improbable, in a not too distant future, it will be essential to think seriously about guaranteeing a fundamental right, which could be the foundation of the artificial intelligence era: the right to the inherent and random and imperfect diversity of the human being.

⁴² See S. RODOTA, , *The Right to Have Rights*, Trotta, Madrid, 2014, p. 302.