
Artificial intelligence and rights of people with disabilities: The power of algorithms

Abstract

Artificial intelligence (AI) has revolutionized our lives and will continue to transform them dramatically for the decades to come. Its potential is indisputable and its applications can bring important benefits to people with disabilities. However, AI is a clearly ambivalent reality and, along with its positive aspects, it also presents downsides that come with various fundamental risks, many of an ethical nature, capable of creating new types of discrimination that curtail the rights of such groups, always in constant vindication, especially in the face of new realities. This paper will review in a generic sense the advantages and disadvantages of artificial intelligence in relation to people with disabilities, with a specific focus on algorithmic biases, a key element with a recognized capability to organize the society and influence policies and institutions through autonomous decision-making, based on a behaviour that may be unfair and discriminatory. Finally, we will present some possible solutions that tend to shape this still incipient phenomenon so it develops in service of every kind of people, including those who present any type of disability.

Keywords

People with disabilities, human rights, Convention on the rights of persons with disabilities, artificial intelligence, algorithmic biases.

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1. Artificial intelligence (AI) and the use of algorithms: A new reality of lights and shadows

AI –a term first coined by the American computer scientist John McCarthy, in 1956, during the Dartmouth Conference, where the discipline was born–, is a branch of computer sciences in charge of studying the counting models capable of doing human being’s activities based on two of their main features: reasoning and conduct. This idea of imitation of human behaviours is precisely the axis around which de Asís’s description of the AI is articulated when he states that artificial intelligence is a science which tries to “create systems that, for some people, think as humans; for some other, act like humans; for some others; think rationally; and for some others, act rationally”:

Artificial intelligence as a term currently covers a set of fast-developing technologies able to generate a wide range of economic and social benefits in various areas and activities. It works based on the machine simulation of human intelligence processes, which include learning and self-correction. According to the European Commission (2018, 1), the term “artificial intelligence” is applied to those systems manifesting an intelligent behaviour, capable of analysing their surroundings and move to action –with certain autonomy range– in order to achieve specific objectives. IA baes systems may be an informatic program (such as voice assistants, image analysis programs, voice and facial recognition systems) or be incorporated to hardware devices (such as advanced robots, autonomous cars or drones).

How does artificial intelligence work? The European Parliament (Boucher, 2020) is creating an interesting summary of its chronological development that allows us to recognise three different successive approaches. The first wave of early AI techniques is known as “symbolic AI” or expertise systems. Here, human experts create precise procedures based on rules, known as “algorithms”, that a computer can follow step by step to decide how to respond intelligently to a determined situation. The second wave includes data-focused approaches that have rapidly developed during the last two decades and are the main provokers of the current resurgence of the AI. These approaches automatise the algorithm learning processes without the need of the human AI experts of the first wave. Artificial neuronal networks (ANN) are inspired by the way the brain works. Inputs are translated into signals that go thought an artificial neuronal network to generate results interpreted as responds to those inputs. The third AI wave draws on its possible future potential. While first’s and second’s wave techniques are described as “weak” or “thin” AI, in such sense that they can be intelligence in certain tasks, the “strong” or “general” AI handles algorithms that can show intelligence in a wider range of contexts and problematic areas. This stage of general artificial intelligence is not reachable with our current technologies and requires significant progresses involving a paradigm transformation.

In addition to this, there are various definitions of “algorithm”. This way, Robin Hil defines algorithms as a mathematical construction with a finite, abstract and effective control structure with imperative action to fulfil a purpose based on a series of criteria (Hil, 2016, 39). Monasterio Astobiza offers a more comprehensive concept (2017) presenting it as a software code that processes a limited series of instructions, and points out three defining features: universality –algorithms are indispensable in an era where technology covers all aspects of life–, opacity –despite being present and controlling key issues of our everyday life, algorithms are invisible, inscrutable and hermetic– and finally, a fundamental factor, an absolute impact in the lives of people. Definitely, an algorithm is a set of defined, non-ambiguous rules or instructions, organised and finite, designed and used on AI, allowing it to solve a problem, perform a counting, process data and make decisions using said data. Monasterio Astobiza (2017) has another example that may be clarifying, expressing

that an algorithm behaves as a decisive tree that, depending on the information about temperature, wind, date, whether it is or is not raining, etc, advise us which jacket we should use; just as the dynamic price algorithm that has settled the tickets for the last Bruce Springsteen tour between 200 and 5000 dollars, a flexible sells strategy that is updated in real time and adapts the prices to the evolution of the demand. It has been systemically used for more than a decade in airlines and hotel chains and now is exported to massive performances due to the rising of e-commerce and the advances in AI (Echarri, 2022).

Bariffi (2021, 6-7) completes this triad adding to AI and algorithms the Big Data, thus presenting the AI systems as “self-fulfilling programs conformed by a complex algorithm network that is constantly preying on big data”, noting that “algorithms are the DNA of the AI systems and big data are the energy allowing them to grow, develop and fulfil its function”:

AI systems and the use of algorithms have generated various application that might ease people’s lives, set innovative goals to public policies and, definitely, start more efficient processes, such as solving calculations faster and with lower costs, assessing the reality, predicting or making decision about specific objectives that may differ from those taken by human beings (Boix, 2020). Automate decision making is born in this exact context, which is understood as an automatized reasoning meant to assist or replace a decision-making process that, in other circumstances, would be made by humans and that necessarily implies data compilation and processing. Machine learning is also gaining importance, a branch of AI formed by a set of techniques and algorithms used to “train” a machine so it can automatically recognise patterns in a series of data and produce models explaining or predicting future data. This means, the machine is able to learn without being explicitly programmed to do so (Council of Europe, 2019). All of the previously mentioned are necessarily interconnected notions carrying the algorithm transit, AI, to advanced autonomous learning systems and smart robotics (Cotino Hueso, 2019a).

The *White Paper on Artificial Intelligence* of the European Union states that AI and the use of algorithms have a great potential to change our lives through aspects such as better healthcare (more precise diagnosis and a better illness prevention), a rise in agricultural efficiency, a contribution to alleviate climate change, an improvement of the production systems, an increase in security for the European population and a whole series of transformations that we can only imagine today (European Commission, 2020). The proposal for a *Regulation of the European Parliament and of the Council laying down harmonised rules on Artificial Intelligence* (European Commission, 2021)¹ also remarks the AI relevant benefits, establishing that, through a better predicting, operation optimizing, resources assigning and service delivery personalising, AI may generate positive results from a social and environmental point of view and provide essential competitive advantages to European companies and economy. This is fundamental in areas with a huge impact on population such as the environment and the healthcare system, the public sector, finances, mobility, home affairs and agriculture.

1. This regulation designs a system to minimize the risks of the AI in order to guarantee that AI systems used in the Union are safe and respect the legislation in force laying under the fundamental rights (Charter of the Fundamental Rights) and the Unions values. The proposal for a Regulation intends to ensure a high level of protection for said fundamental rights, with emphasis, in this matter, on the right to human dignity (art. 1) and to non-discrimination (art. 21). Undoubtedly, it introduces ethical considerations about the use of the AIs. However, it does it approaching a series of rights as a group, as well as the incidence of AI in very diverse fields, therefore, its specific references to people with disabilities are very limited. This way, it only refers to them to point out that the proposal will positively affect the rights of a series of special collectives, as the inclusion of people with disabilities (art. 26); or it mentions –making reference to the prohibitions that are established in the matter of AI –that those fulfil practices with a significant potential to manipulate the population through subliminal techniques that go further of their understanding or exploit the vulnerabilities of groups with specific risks of exclusion, such as people with disabilities.

Nevertheless, those same factors and techniques that are favourable for the socioeconomic benefits of the AI can also create new potential risks or negative consequences for concrete groups of people or for the society as a whole. Some of them are related to responsibility, lack of transparency, complexity, the substitution of human intervention and, as a consequence, the lost of control over technology (often associated with a transition from a human-managed AI to an independent AI), the lack of clarity regarding decision-making², security, data protection, citizens' privacy, etc... (Yudkowsky, 2008; Monasterio Astobiza, 2017; Taddeo and Floridy, 2018; Wirtz *et al.*, 2019; Cortino, 2019; Bariffi, 2021; UNESCO, 2020).

These weaknesses of risks shape the biases that might prejudicated the rights and freedoms, the human dignity, and the worth of diversity associated to the information on which AI is based, as well as the design operative, the goals, implementation and working of the algorithms that do the operational calculations and make decisions that directly affect us every day in important issues.

Therefore, we must be vigilant and take a critical point of view about AI's development and fix its flaws given the fact that we as risking the possibility of using its potential to make our civilization move forward and liberate humanity or, on the other hand, jeopardising our autonomy and lose it to a superior intelligence whose focal point are not the human goals (Russell, 2020). Hence the creation of a set of norms and papers, which most of the times are simply advises or non-binding principles, that aren't always properly complied with (Joamets and Chochia, 2021), and that have not been able to overcome the separation of AI and rights, just as it is said by Asís (2020). Some of those are referred to along these pages, being specially highlighted the enumeration made by Bariffi (2021)³.

2. Effects of the AI phenomenon on people with disabilities

As an introduction, it is interesting to list some information about people with disabilities, who are currently around 10 % and 15 % of world population –between 650 thousand and a billion people, in absolute terms⁴–, and this number is growing, according to the World Health Organization (WHO), due to the growth of population, the advances in medicine and ageing. 80 % of people with disabilities are in developing countries,

2. One of the most frequent complaints regarding AI is connected with its lack of clarity, which means that the way algorithms operate and other issues in the matter are unknown to most of the population, who ignore how they work, what they work for and, mostly, how do they make decisions that might importantly affect people. The algorithmic lack of clarity challenges relevant principles of the matter of personal data protection (data minimization, purpose of the data treatment, profile creations...), which is even more concerning given the enormous wave of information managed by these systems. In order to counteract this handicap, transparency is proposed as the best solution: there is a need of transparency regarding the decision making that constitutes today a significant preoccupation to the governments and international organizations. Nowadays, data and algorithm transparency mean, according to Sangüesa (2018, 2), the capacity of knowing which data are used, how are they used, who uses them, what do they use it for and how to go from collecting data to decision making that might affect the lifestyles of those who demand said transparency.

3. According to Bariffi, some important text regarding the topic are 2018'S *Toronto Declaration*, made by Amnesty International, Access Now, the International Observatory of Human Rights and the Wikipedia Foundation; the *Declaration on Ethics and Data Protection in Artificial Intelligence* created in the International Data Protection and Privacy Conference (IDPPC); the *Universal Guidelines for Artificial Intelligence*, a document sponsored by The Public Voice in 2018, and supported by over 50 scientific organizations and more than 200 experts all around the world; in the EU there have been many documents addressing the ethical and legal aspects of the AI systems, such as *Ethics Guidelines for a trustworthy AI*, assumed on 2019; *Guidelines on Artificial Intelligence and Data Protection*, from the European Council; the *Declaration by the Committee of Ministers on the Manipulative Capabilities of the Algorithmic Processes*, also from 2019; and, lastly, the text *Unboxing Intelligence: 10 steps to protect human rights*, from that same year.

4. The first figure is given by the UN (2022) and the second estimation comes from the World Bank (2022). The rest of the global data is collected by both organizations: <https://www.un.org/es/observances/day-of-persons-with-disabilities>; <https://www.bancomundial.org/es/topic/disability>.

according to the United Nations Development Program (UNDP). People with disabilities are more likely to experience adverse socioeconomic results, like lesser educational achievements, having underlying additional medical needs, higher unemployment rates, higher possibilities of being a victim of violence, higher poverty rates and a higher mortality rate. On the other side, in most of the OECD countries, women have higher disability incidence's than men and, therefore, live a multiple disadvantages situation, due to the combination of disability and gender, which makes them especially vulnerable to various forms of abuse. The most relevant challenges to social and economical inclusion are the lack of accessibility to physical environments and transportation, the lack of support devices and technologies, non-adapted media, deficiencies in service providing and prejudices and discriminatory stigmas. Some comparative studies lying on legislation in disability matter show that only 45 countries have specific laws regarding the topic.

Spain has generally the same tendencies; we will only amplify with some data collected by the Disability, Personal Autonomy and Dependence Situations Survey (EDAD-2020) (National Institute of Statistic, 2022)⁵, which have stated that:

- A total amount of 4,38 million people living in nursing facilities claimed to have a disability or limitation in 2020, which affected 94,9 people out of each 1000, with a higher rate for women (109,2) than for men (80,1). In terms of age, 75,4 and of the group was 55 year or older.
- Types of disabilities: mobility problems are the most frequent kind of disability. All types of disabilities affect more women than men. 55,7 % of people with disabilities have relevant mobility issues, 46,5 % of them have difficulties associated with the household and 31,6 % have difficulties associated with self-care. 3,3 million people received some kind of technical help or personal assistance.
- Education: 99,5 % of minors between 6 and 15 years old are going to school. 52,1 % received curricular adaptations or support to reach a satisfactory educative inclusion, 24,2 % received them but it was not helpful enough and 11 % did not receive it. 47,7 % of students between 16 and 24 received secondary education and 19,1 % received special education. Between 25 and 64 years old, 35,9 % attended to a vocational and occupational training centres and 21,5 % to a special education centre.
- Employment: 1,58 million people with disabilities were population of working age in 2020 (between 16 and 64 years old). Almost one on four people affirmed to have a job (23,7 % men and 23,5 % women).
- Limitations: 34 % of people with disabilities claimed to be affected by architectural barriers or barriers in the public transportation, which are limiting their access to their workplaces, schools, places to practice sports, recreative activities or simply to meet other people. 39,4 % of people with disabilities affirm to have difficulties accessing the new technologies with informational or educational purposes.
- Discrimination: discrimination affects two out of each 10 people older than 16. This figure varies depending on age and on certain areas of life.

Nowadays it is undeniable that people with disabilities have experiences important progresses in terms of the consolidation of their rights and of getting a better quality of life, which are reflected in the United Nations International Conference on the Rights of Persons with Disabilities (CRPD)⁶, which is the first international legally binding instrument establishing minimum standards to the rights of people with disabilities and that, at the same

5. https://www.ine.es/prensa/edad_2020_p.pdf.

6. CRPD was approved on December 13th 2006 by the United Nation's General Assembly, it was ratified in Spain on December 3rd 2007 and came into force on May 3rd 2008. The Convention means the confirmation of a perspective on the rights of people with disabilities who became considered entitled to those rights whose whole and effective exercise must be guaranteed by the public institutions.

time, has given rise to strategies and regulations in the European Union⁷ and in the member countries⁸. Its constant development pretends that every person with disabilities, no matter their gender, ethnic, religion, beliefs, age or sexual orientation, can fully enjoy their human rights, reach equality in opportunities, achieve equal access to participation in economy and society, be able to decide where, how and who to live with, move freely, without restriction of their support needs and, definitively, stop experiencing discrimination on a daily basis.

However, entering and celebrating these progresses does not deny the fact that equality of rights and opportunities for people with disabilities is still a struggle. Because of this we can be sure that the irruption of the artificial intelligence, a completely new reality in whose initial design there was barely none intervention for ethical and human right's related issues –particularly those in connection to the use of algorithms for the governability– is surrounded by important implications with a connection to such collectives, that can both have a positive and advantageable influence or become a risk of limiting equality of opportunities and the full exercise of their rights.

Ultimately, we cannot deny that AI has an outstanding potential to improve the life of people with disabilities. Nonetheless, carefully observing the situation will prove that we are not facing a neutral and objective machine, so it is essential to analyse, modulate and neutralise those prejudicial implications which may negative affect the human rights. This is, in its core, the UN Special Rapporteur's position on the Rights on Persons with Disabilities, Gerard Quinn, on his report to the Human Rights Council in compliance to his resolution 44/10 (UN, 2021), which contains a study on artificial intelligence and the rights of persons with disabilities synthesising the main issues raised by this new reality⁹, sharing the point of view of other analysis on the matter and whose most relevant conclusions are quoted along this document.

This way, and with the goal of approaching the most significant aspects of the AI-disability duality, in this section we will study, firstly, the way the CRPD rights obligations might be affected by the AI; secondly, the Rapporteur's explanations on the issue of the Rights of Persons with Disabilities; and, lastly, the advantaged and disadvantages that the use of AI and algorithms may have on the life of people with disabilities, as opportunities and easiness and breaks on equity and right's vulnerating, respectively.

2.1. CRPD rights and obligation on the perspective of artificial intelligence

We will then begin with a synthetic review to the non-exhaustive reasoning made by the Special Rapporteur on the Rights of Persons with Disabilities with regard to the legal obligations established by the CRPD to the States concerning the use and development of AI (UN, 2021), in which we will strictly follow expositive order

7. The formal ratification by the United Nation's Convention on the rights of the persons with disabilities on January 2011 meant that, for the first time on history, the EU became a part (the 97th) of an international human rights treaty which established minimum regulation to protect and safeguard a wide range of civil, political, social and economic rights of people with disabilities, thus reflected the Union's compromise to built an Europe without barriers for the near 80 million people with disabilities living in the EU in 2020. The Convention established minimum guarantee standards for the rights of people with disabilities and ensures its exercise in equal conditions to the rest of the citizens (MEMO/10/198). This regulation means, for the EU, assuring that the whole legislation, the politic and programmes in a communitarian level meet the dispositions of the Convention, between the limits of the EU responsibilities (European Commission, 2011).

8. In Spain, the Royal Legislative Decree 1/2013, from November 29th, that was approved on the Rewritten Text of the General Law on the Rights of People with Disabilities and their Social Inclusion, declares on its motives exposition that the Convention is its main referent.

9. By doing so, just as the report affirm (UN, 2021, 5), it is based on other declarations on artificial intelligence casted by other Special Rapporteurs on the right to development, education, promotion and protection of the right of freedom of opinion and expression, on the human rights, contemporary forms of racism, racial discrimination, xenophobia and intolerance, slavery and on the right to privacy; as well as the Independent Expert on the exercise of human rights for the older people. All of them partially analyse the particular consequences of the use of AI for people with disabilities.

of aid report that treats, in the line of the Commissioner of the European Council on Human Rights (Council of Europe, 2019) of creating an adequate balance between technological development and protection of human rights. There are two main responsibilities: the regulatory responsibility “to avoid discrimination for disability reasons” (art. 4, paragraph 1e), and the obligation to promote the design and development of information technologies “at an early stage” (art. 9, paragraph 2h). This approach goes beyond the classic, yet fundamental, issue of accessibility to the new technologies for people with disabilities and focuses on how AI tools affect them in terms of equality or discrimination with the goal of achieving an objective that, although simple in formulation, in practice is highly ambitious, which is not leaving anybody behind (CERMI, 2019; European Commission, 2022). Said purpose is included in a development model that takes into consideration people’s diversity of capabilities¹⁰ and in which people with disabilities are a strategic asset for an inclusive technological development.

The rights reflected in the CRPD which are strongly to the development and use of artificial intelligence systems are:

- **Right to equality and non-discrimination (articles 2, 5 and 18)**
Inclusive equality (art. 5) is at the heart of the Convention, as all rights must be guaranteed in conditions of full equality. This implies the exclusion of any kind of discrimination, for which persons with disabilities may require, in the exercise of their rights, reasonable adjustments (art. 2) which, in order to be applied, require an exhaustive analysis of the personal circumstances of each person, in an individualised process adapted to their needs. The Rapporteur also highlights that, in the context of AI, such an obligation may have an anticipatory dimension, anticipating the reasonable justified adjustments, without waiting for the interested parties to request them, in matters such as selection or interview tools that use AI, or in the use of biometric technology to facilitate legal proof of identity and unlock access to essential public service.
- **Right to autonomy and to decision making (articles 3, 12 and 23)**
The Article 3 (general principles) and 12 (equality of recognition before the law) of the Convention enshrine the natural value of a person and their inherent rights to autonomy and decision-making. This requires their consent to be informed, real, transparent, effective and never presumed. Machine learning and profile creation used in the AI jeopardise those rights. Particularly, the reports issued by international organisations quote their preoccupation on the use of AI based technologies on the screenings on the health and reproduction areas or in DNA and genetic tests.
- **Right to privacy (articles 22 and 31)**
This right and data protection are fundamental to the AI matter and are focused on the collected information of people with disabilities, the content they create –for all of which they must be able to act and receive support to accessing, safely sharing, understanding the use, controlling and deleting their data– as well as the information managed by the algorithms.
- **Right to work and employment (article 27 and 9)**
The Convention protects them against discrimination on the basis of disabilities in the workplace, including the selection and engagement conditions, the continuity of the occupation, promotions and

10. The CRPD goals intertwine with the Sustainable Development Goals (SDG), approved in 2015, which are part of the 2030 UN Agenda as a tool for change (UN, 2018, CERMI 2019). <https://www.un.org/sustainabledevelopment/es/repositioning-the-un-development-system/>.

working conditions, as well as the obligation of offering reasonable adjustments. A comprehensive interpretation of the articles 27 and 9 of the Convention demands the employers to avoid the discriminatory effects in the use of AI tools that might bring important exclusion risks for the people with disabilities caused by atypical attributes¹¹, specifically before that a human interviewer meets the candidate.

- **Right to education (article 24)**

The impact and effect of the AI systems on education are extraordinary and should favour inclusive education at all levels, reasonable adjustments and personalised and effective support measures, just as is established by the Convention. On the other hands, AI threats come from its capability to boost and justify segregation on education, which the UN Special Rapporteurs on the Rights of Persons with Disabilities uses to highlight the enormous potential of the AI systems that, in case of being used poorly, or being used without previously solving the discriminatory risks attached to them, might bring back the advances made in order to achieve the inclusion of people with disabilities on the education by reaching arguments or making decisions that could separate them from the rest of the students.

- **Right to an adequate living standard and social protection (article 28)**

There are two AI-related risks in this field. Firstly, the lack of clarity of the decision-making on social services and public support benefitting people with disabilities, and secondly, the risk of reinforcing the barriers to accessing the labour market by the job elimination caused by automatization¹².

- **Right to health (article 25) and right to habilitation and rehabilitation (article 26)**

The Convention forbids the discrimination of people with disabilities on the access to healthcare and rehabilitation. This is why, in spite of the undeniable advantages of the AI developed tools, some attention or health services or medical and life insurance covers might be denied with motives of disabilities.

- **Freedom of expression and opinion and access to information (articles 21 and 29)**

The Convention guarantees the right to freedom of expression (art. 21) and to collect, receive and give information without interference, right that AI might promote by assuring the supply of information on accessible formats and technologies. However, the use of AI might jeopardise the freedom of association of organisations for people with disabilities by limiting their information and online posts and contents, or enable the emergence of online harassment, caused by AI, destined to vulnerable collectives such as people with disabilities.

11. Machine learning learn patterns, which are used on their functioning by evaluating people by features and attributes they consider similar. But, occasionally, people with disabilities do not fit into the norm. Hence why this is one of the biggest challenged to AI: to be able to understand the diversity and the importance of atypical values. Otherwise, said limitation is translated into a unfair treatment to people with disabilities, who sometime receive a negative ponderation on the qualification processes made by artificial intelligences.

12. Some interesting studies on the matter, from which we can highlight a report called *Embracing Change. Flexibility@Work21* (2021) issued by Randstad, a company specialised in Human Resources, classify production automatization as one of the main challenges economy is facing at the moment. This phenomenon is capable of causing one on each seven employees in the whole world to lose their job or, in the case of Spain, 52 % of the current jobs are on risks of being partially or totally automatized during the next decade, including functions on key work area such a food preparation, administrative management and transportation. With the same aim of anticipating changes, the World Economic Forum predicts a new division of the workload between employees, computers and algorithms (Muro *et al.*) If we focus particularly on how this will affect employees with disabilities, the study *The Labour Market of the Future and How it will Affect People with Disabilities* (López Costa, 2021), affirms that recent digital technological advance are eliminating at a higher range the jobs offers related to routinary tasks, both cognitive (28,6 %) and manual (29,12 %), which might result on employability problem to people with disabilities, who are congregated in the service sector and perform activities as gardening or costumer service, barely related to the international tendencies –pointing out to a higher demand of employees on jobs in connection with green economy, data economy, artificial intelligence and care economy, as well as new profiles on engineering, product development and the cloud.

- **Participation on political and public life (article 29). Active consultation (articles 4 and 7)**

The wide range of AI tools used in the electoral field might improve the access of people with disabilities to the political process, as long as they are developed in an accessible way, taking in consideration their needs and concerns. The Convention also demands proactive measures which guarantees the vigilance in order to avoid that artificial intelligence is used for unethical objectives that might inhibit or narrow down the political participation of people with disabilities.

- **Public acquisitions (article 4). Active consultation (articles 4 and 7)**

The Convention, as well as many documents issued by international organisations, demand the governments and public administrations to acquire AI systems and tools which are inclusive¹³ and non-discriminatory on the basis on disability. On the other hand, people with disabilities must be actively consulted during the design, development and implantation of the politics and systems based on artificial intelligence. This entails, among other things, the diversification of the teams in charge of designing, developing, compiling and processing data and of implementing, investigating and regulating the AI based products and services; or, on the other hand, that the AI products and services designed for children with disabilities take the best interest of the child into consideration, respecting the evolution of their capabilities and guaranteeing their adequate participation on said processes.

- **Other rights and policy areas**

It is also important to maximise AI's potential and mitigate its negative impact on the rights and lives of people in other fields and in connection with other rights. This affirmation is standing, among other things, with regard to risk situations and humanitarian emergencies (art. 11), with the aim of preventing modern slavery, trafficking in human beings and child exploitation related to people with disabilities. Similarly, on the area of international cooperation (art. 32), new technologies can be used to promote inclusive artificial intelligence systems.

2.2. AI and the use of algorithms as an opportunity

People with disability were among the first groups who started using interactive AI tools on a daily basis (Bigham and Carrington, 2018): Since then, the capabilities of AI and new technologies which could benefit people with disabilities and boost inclusive equality in various fields covered by the CRPD, as it is employment, access to commercial goods and services, independent life and education (UN, 2021). The UN Special Rapporteur on the Rights of Persons with disabilities talks, in all of these cases, about an AI “used in an adequate and responsible way”, or an AI “properly adjusted to individual circumstances”, but the fact is that there are many areas and applications quoted in his report that set an example on the artificial intelligence liberating potential for the people with disabilities. We can highlight:

- The capability of speeding up a sustainable development which benefits people with disabilities directly and indirectly (UN, 2021; McClain-Nhlapo and Samant Raja, 2021).
- The pursuit of innovative and effective reasonable adjustments for people with disabilities, as well as

13. An inclusive AI system is that which is capable of including the diversity of people, groups and collectives affected by it during each step of its development. In order to do that it must have a clear compromise to solving eventual bias issues, data privacy issues and lack of representation issues by constantly re-evaluating such questions along its design and deployment, to insure that all the interested parties, communities and groups are receiving the benefits of technology without struggling with any harm (World Economic Forum, 2022).

the positive contribution of the AI systems to support technology, allowing, for example, the improvement of rights concerning the mobility of blind people or partially sighted persons through navigation tools, or the development of software technologies for eye tracking or voice recognition –the last ones are important accessibility tools for deaf people or people with hearing impediments, and the speech recognition mechanism is also useful for people with hand-movement impediments related to traditional input mechanism (Guo *et al.*, 2019). All of these AI systems and tools allow people with disabilities to communicate and transmit information and to access education.

- The wide range of possibilities offered by adapted learning platforms to personalise the instruction of students with disabilities or to increase the access of people with disabilities to education through tools such as individual mentoring or creative games, which are beneficial for the learning of social abilities and problem resolution. Voice-to-text converters are also highly useful, given the fact that they favour the communication to people with speech impediments without the need for interpreters (Global Disability Innovation Hub, 2021), just as the avatars using sign language are useful for people with hearing impediments.
- AI apps are also relevant on the matters of mental health, disease diagnosis and rehabilitation¹⁴.
- On the other hand, the independent life of people with disabilities may be notoriously boosted by new emerging technologies through the introduction of robots and other AI tools in the households to offer medical care and other types of assistance. The UN has highlighted that the access to technology is fundamental in order to achieve a complete and equal participation on this area¹⁵.

To sum up, we cannot deny the key role that technology in general and artificial intelligence in particular play on accessibility and inclusion, which has been highlighted by many contributions (Okeenea Group, 2021), improving the day-to-day life of people with disabilities in aspects as communication and connection to other people, movement abilities, independent life or access to the same services as everybody else, emphasizing their possibilities in such areas as decision-making, healthcare and rehabilitation services (Bariffi, 2021). On the other side, there are also voices claiming that AI can sometimes offer too many promises to people with disabilities and, therefore, cause frustration (Smith and Smith, 2021).

2.3. Artificial Intelligence's discriminatory systems and uses for people with disabilities: Algorithm biases that jeopardise equality and create discrimination

AI systems design and implantation face a fundamental ethical challenge: overcoming the unequal treatment caused by data management in regard to specific collectives, which is included –with more or less conscience of it– in the algorithms. Specifically, in this field have great importance those inequalities and discriminations that act through stereotypes, biases on data collection and management, or the scant participation that people with disabilities still have not reached in many economic, social and cultural spaces, which historically has been inexistent.

14. The National Centre of Competence in Robotics Research of the Swiss Federal Institute of Technology Lausanne has developed a very specific example of this: a leading-edge AI software based on an algorithm coordinated to a robotic harness which favours the natural movement of people affected by spinal cord lesions, acute cerebral stroke, multiple sclerosis or cerebral palsy, among other neurological disorder that cause any limb palsy, whether it is on the lower half of the body or tetraplegia (INFOBAE, 2017).

15. As it was stated by Ban Ki-moon, on the International Day of Persons with Disabilities 2014, focused on sustainable development and the promise of technologies. <https://www.un.org/es/events/disabilitiesday/2014/>.

AI breaches present in algorithms are and generalized and critical problem that affects negatively and discriminated certain groups –women, people with disabilities, the LGBTI collective...–. An analysis of the currently existing biases and the inadequate construction and use of algorithms in connection with people with disabilities would then include such considerations (Smith and Rustagi, 2020):

- The sets of data used to build algorithms are fundamental: AI make decisions based on said information and there are many points where a bias might appear. On the other hand, including disabilities in the artificial intelligence requires knowing and interpreting not only the sets of data used, but also the decision-making process of the AI system in order to avoid discrimination (UN, 2021).

The data conforming the algorithms are generated from the daily activity of people (for example, health condition, consumption habits, behaviours) and compiled through diverse platforms and other sources. Although the data is thought to be precise, there are important gaps (few or none information coming from certain individuals or communities), in addition to those which might contain clearly discriminatory aspects. In connection with the first issue, Quinn (UN, 2021) sets as an example the low likelihood of finding a disabled person when we look for the term “athlete” on an AI enable searching engine and points out that said matter is still based on the use of a historical practice, which includes various biases, instead of updating the information and models in use. This perpetuated the discrimination of historically excluded groups, given that inclusive practices have just appeared shyly and recently (Mills y Whittaker, 2019).

- Initial screening systems and platforms constitute a negative element because, as they are not completely accessible nor do they incorporate reasonable adjustments, they generate incorrect and biased data.
- Bias can also come from the scarce experience used by the artificial intelligence model to calibrate the differential capabilities of people, which uses inappropriate and non-rigorous information. This would occur if an AI system is used on a context or for cases different of those for which it was originally developed (for example, if we applied models designed for people without disabilities for those who have them). In this case, biases and errors in predictions might appear, whether they are generated intentionally or unintentionally.
- Besides this, people with disabilities don't constitute a homogeneous group. This has been pointed out as an additional issue when it comes to approaching equity in the use of algorithms, given the fact that the diverse types of disabilities, its levels and nuances, make it difficult to treat it as a simple variable with a small number of possible values (S. Trewin en Hao, 2018), which acts as an amplifying factor which complicates those interventions with the aim of correcting possible algorithm biases.
- On the other hand, we cannot eliminate the human influence in the process (Berendt and Preibusch, 2017). In many cases there are persons in charge of deciding what, where and how to store the collected and categorised data, as well as which parameters are used. Finally, data are also labelled, which is an activity with a high level of subjectivity. During all of these operations there are value judgements that might be erroneous for various reasons.
- A set of biased data might not be an accurate representation of society if it over-represents or sub-represents certain identities in a particular context. In other cases, biased data might be accurate but at the same time the representation of an unfair society, as they reflect the discrimination that is in fact being experienced by certain groups of people. Both these premises are clearly suitable to people with disabilities.

- There is also an important criticism regarding the facial recognition systems and emotional recognition systems.

In connection with the first one (UN, 2021; Binns and Kirkham, 2021), many biases inherent to some facial algorithms have been detected. These are prejudicial to people with disabilities because they are barely reliable as a consequence of the imbalances of their faces regarding the model programmed by the AI system. Besides, there are functioning difficulties in the facial analysis programs in the cases of users with physical alterations such as Down syndrome, achondroplasia, cleft lip or cleft palate, as well as to blind people or people with sight difficulties due to the eye anatomy and to issues as albinism. Furthermore, AI systems don't always work properly with the facial expressions of autistic people, people who has the Williams syndrome or other atypical facial expressions resulting from an acute cerebral stroke, from the Parkinson's disease or Bell's paralysis (Guo *et al.*, 2019).

When it comes to emotional recognition systems, which are used to issue value judgements on people, its use may bring various problems related, among other things, to confidentiality and privacy (UN, 2021).

- The bias can also affect an algorithm in different moments. It can be when the purpose of an AI model and the limitations it works under are defined or when the inputs it must take into consideration in order to find patterns and get to conclusions are picked up, whether it selects data and/or proxies or variables. An algorithm can also discriminate certain population groups, regardless of the quality of the data, depending on how it evaluates said data.

Definitely, discrimination towards people with disabilities produced by IA and the use of algorithms is originated by deficient and/or unrepresentative data, or out of context data, by the lack of transparency of technology –which makes it difficult to detect its discriminatory effects–, by the strength of historic discriminations, by not taking into consideration the level of intervention and relevance AI has in various fields and contexts and, finally, by the non-compliance of the responsibility to make reasonable adjustment, increasing the disadvantages it brings to people with disabilities and the consequent growth of their vulnerability. A similar reasoning is made by Bariffi (2021) who systematises the risks brought by AI to the enjoyment and exercise of rights to people with disabilities, highlighting: a) the use of AI systems to identify and, eventually, discriminate people with disabilities; b) the creation of AI systems based on normalisation models which exclude or not take into consideration people with disabilities; c) the designing of AI system based or nurtured by data which include stereotypes and prejudices regarding disability, and d) the use of AI systems which don't allow people with disabilities to participate or make decisions.

3. Final thoughts and recommendations

AI and the use of algorithms have entailed a quality step forward with fundamental innovative implications in various areas. AI brings undeniable possibilities to efficiently confront the important challenges faced by modern societies, specially on the issue we are discussing regarding people with disabilities, to improve their wellbeing, their quality of life and the full exercise of their rights. On the other hand, we must analyse its disadvantages and potential risks in order to identify and combat them, and in order to achieve that it is

necessary to underpin the AI designing with a series of indisputable ethical considerations –which, furthermore, are multiplied at the same time as their ubiquitous usage (Tasmados *et al.*, 2022)– and to respect them, so that the focus is on the fact that the most important things are people and their rights. Equity, ethics and the guarantee of the effective exercise of human rights must be the key points to modulate AI, such as it is affirmed by important studies on the matter.

In this sense, Quinn (UN, 2021) proposes to focus the debate on new technologies and AI in the specific challenged that said realities mean for the rights of people with disabilities, enumerated on the CRDP. Among them, as we have analysed, are the rights to privacy, to autonomy, to education, to employment, to health-care, to independent life and to participation. According to Cotino Hueso (2019b), in line with the Group of Experts of high level on AI (European Commission, 2019), with the *European Declaration on the Rights and Digital Principles for the Digital Era* (European Commission, 2022) or with other academics, such as Rafael de Asís (2014, 2015, 2015b), the starting point and ethical premise of AI in numerous declarations and documents treating it is not other than dignity and fundamental human rights. The author also points out the existence of an ethical model on AI made in Europe, in which simply respecting the law is not enough, but it is necessary to consider the ethical dimension of data treatment (European Data Protection Supervisor, 2015, p. 4 and next). Cotino Hueso (2019b), concludes by pointing out that it is still early for concrete regulatory responses, but it is the perfect moment to an ethical proclamation on AI while insisting in overcoming a general ethic of AI, based on generic ethical principles already settled, in order to stablish concrete regulations on content, organisation and procedures and on the practical implantation of processes, organisms, committees and compliance systems.

Just as it is said by Binns and Kirkham (2021), only the management of the wides equity considerations on AI will offer new opportunities to people with disabilities and develop assistance technologies, which will positively promote their rights. The equity problems affecting people with disabilities might be more complex than those affecting other groups, specially in those cases where people with particular kinds of disabilities are a minority (Guo *et al.*, 2019).

Particularly, regarding the use of algorithms and AI in general, different studies on the issue (Smith and Rustagi, 2020; UNESCO, 2020; Ávila *et al.*, 2018; UN, 2021), interesting recommendations concerning various orders of topics have been made:

- In connection with the work team, there is an encouragement to building diverse and multidisciplinary teams to work in algorithms and AI systems. At the same time, it is imperative to promote a culture of ethics and responsibilities in all of the areas related to AI, which fosters them to prioritise equity considerations in every step of the algorithm developing process (design, implementation, evaluation...). Also, work teams must benefit from the experience of people with disabilities, who are pioneers in using several AI applications, and respect their right to an active intervention in those issues affecting them, so that they can develop mechanisms based on the real needs of the user and on their abilities (Bigham and Carrington, 2018)

AI's politics and systems development and implantation must count on the active participation of people with disabilities and those organisations representing them, just as it is stablished by the CRDP (UN, 2021).

- On the other hand, as eliminating the biases generated by AI might not be feasible, organisations must keep an accountability standard around the functioning of the models and the transparency regarding

possible deficiencies. AI systems must not only be public in clear and accessible terms, but also people must be able of understanding how the decisions are made and verified (Council of Europe, 2019). Transparency requirements are a key element (European Commission, 2021), given that finding evidence that the information nurturing AI systems and the correct functioning of algorithms can be discriminatory is an impossible enterprise without a minimum grade of transparency. This is not only advisable in regard with the information given but also with the observed behaviour data or with the intermediate transformations of said behaviours that might work as inputs for AI systems. Transparency also comprises the obligation to offer significant information about the logic of automatised decisions, as well as the public disclosure of information on the AI system, its processes, direct and indirect effects on human rights and the measures taken in order to identify and mitigate its adverse impacts on said rights (Council of Europe, 2019). In any case, the available information must allow a significative evaluation of the AI system.

- Definitely, AI system's transparency and accountability are essential tools so as to neutralise discrimination against people with disabilities, especially considering the series of adverse conditions in their daily living (Binns and Kirkham, 2021). The lack of transparency (AI's opacity) makes it difficult to detect and prove the possible breaches of the legal dispositions protecting fundamental rights, imputing responsibilities and allowing to claim an allowance (European Commission, 2020).

Truth is that it results highly difficult to implement transparency requirements in the field of AI given the so-called "black box", a concept referring to the fact that the functioning of AI systems is hidden, whether because of the complexity of the computer codes, because of intellectual property protection right or because of data protection, motivating sometimes to its annulation. Algorithms and AI systems are scantily transparent o completely opaque (Monasterio Astobiza, 2017), a factor on which is based the discrimination against people with disabilities and which hinders the posterior prove of said circumstance (Binns and Kirkham, 2021).

- It is necessary to implement the development of responsible data, with commands and equilibrium able to create, if needed, new sets of data, as well as to adapt the data already existent. In order to do that we must stablish politics and practices allowing the responsible use of algorithms, verifying and mitigating the bias in each step of the development process. This means giving the teams ethical frames which prioritise equity when defining the objective of said algorithms, ensuring that the sets of data used are developed and labelled responsively, and guaranteeing that the variables will not undermine any collective of people, and in the topic to which we are referring, people with disabilities. It is necessary to raise awareness so that the organisations using AI tackle the lack of representation and the bias issues, specially in regards with underrepresented groups. We require a compromise of using sets of data developed under a vision of inclusion of people with disabilities (even when it might result in a cost increase), of detecting and fixing the biases and of guaranteeing that said data represent effectively the population which will be affected by the algorithm, and that their rights, needs and expectatives are integrated.
- It is responsibility of the States (UN, 2021; Binns and Kirkham, 2021) to create debates on AI, explicitly keeping in mind the CRDP, and to implement strategies and normatives to guarantee that the proper diligence on the matter of human rights is exhaustive and inclusive of disability, and that the obligation of making reasonable adjustments in the functioning of artificial intelligence systems is respected, so as to reach the full validity of the rights defended by the Convention and to forbid any discriminatory or harmful use and/or effect. In addition, the Stated must supervise the development of the innovative AI tools and solutions, with the aim of detecting and fixing their discriminatory effects to people with disabilities and evaluate their effects on the promotion of rights. With reference to all of this topics, it is responsibility of

the governments to raise awareness in the private sector (developers and users of artificial intelligence), and the public sector, to deploy regulations to guarantee the rights of the whole population and to only acquire AI systems and apps which are respectful to said regulations.

Companies and the private sector in general working in AI should deploy transparency in their activity, employ the proper diligence to respect the rights of people with disabilities and promote them proactively, do AI impact evaluations on human rights with a disability perspective and even offer effective non-judicial resources and compensations in case of discriminations.

- Furthermore, both international and national organisations dedicated to the defence of human rights and/or the rights of people with disabilities must continue with the work dedicated to make a higher understanding of the problems affecting this community possible, as well as to target the debates and to increase their participation on the politics related to artificial intelligence. In this line we can find the proposals of the *Fundación ONCE* and CERMI, which are already working on the design and development of a national plan of social algorithms and inclusion, so that human diversity and disability are approached in data management, which is structured in three lines: boosting disability politics and strategies oriented to the data on which AI solutions are based, fighting the capacitist biases as a source for AI applied to disability, and, lastly, potentiating the fact that AI is put in service of social innovation in disability, highlighting its positive impact from a perspective of human rights approached in the CRDP (CERMI, 2022).

The last two ideas are the key to build a world in which AI does not discriminate people with disabilities and in which, on the contrary, its extraordinary potential is used to make the exercise of any rights possible in a field of true and actual equality.

With regards to the first of them, capacitism describes the natural and desirable state associated with productivity, wholeness, functionality, appearance and normality of a body. This concept articulates a series of practices and processes that subjectively recognise ability as an essential quality of the human body while generating a prejudicated and stigmatised vision of disability as a diminished state of the human species (Maldonado Ramírez, 2019) and of people with disabilities as lacking, incomplete and needed of permanent guardianship as a consequence of a functional feature related to mobility, sensoriality, or affective or intellectual structure (Hernández Sánchez, 2018). Capacitism goes further than simple personal attitudes and is in the foundation on which our society is structured and organised (Barnes, 2016), therefore, it is on the bedrock of a world built and perpetuated around the needs of people without disabilities. With the emergence of AI, reality shows that many of the solutions and applications of AI regarding people with disabilities bring a high risk of impacting harmfully the lives of these people because they were built with capacitist biases. The affirmations on which the algorithms driving artificial intelligence are based can reflect and integrate capacitist suppositions, just as it is said by the Rapporteur on disability in his report, considering disability as a reality deviated from the norm and, therefore, negative. The only solution is placing human rights in the axis of the debate on these technologies, putting the actions and omissions of AI products and services under scrutiny in order to allow a full integration, non-discriminatory of people with disabilities, who cannot be excluded in a world where technology has an essential role. CERMI encourages the vigilance so that artificial intelligences are not nurtured on capacitism and the traditional exclusion patterns are not repeated, patterns based on the idea of seeing people with disabilities as an anomaly that we have to overcome and that bring deeply negative considerations in the lives of people with disabilities. In order to avoid said conceptions we must build an AI that is primarily ethic, and to do that it is imperative that AI development is submitted to clear standards and ruling democratic procedures which guarantee transparency, accountability

and participation of all interested group in the decision-making process and the validation of solutions. Among these groups of legitimate interest, who must have a role to play in this field, are undoubtedly people with disabilities (CERMI, 2020).

However, occasional risks of an AI external to ethical considerations for people with disabilities must not prevent the consideration of a different prism which underlines the extraordinary benefits and the important potential of an inclusive and demanding on human rights AI might mean to them. Despite being a very heterogeneous group of people, in general we can affirm that AI can promote inclusion and accessibility, enable communication and connexion processes, offer them a higher independence and, therewith, a better quality of life. Among the main benefits, CERMI (2020) points out those AI systems which enable the access to information and communication in every via and formats, the decision making, improve accessibility in the environment and reasonable adjustments, AI systems included in robots (androids) which enable personal assistance, automotive AI systems enabling universal design or those which facilitate medical attention and habilitation and rehabilitation services, just to name a few of the potential uses.

Nevertheless, AI must make disability visible and include it on a social and ethical debate to enable a development of said technology through the establishment of uniform regulations and ethical principles, framed inside the principles, values and mandates of the Convention on the rights of persons with disabilities of 2006 and the UN's Sustainable Development Objectives/2030 Agenda. This means putting AI to the service of social innovation on disability.

- Finally, in the framework of social responsibility and leadership, it is proposed to establish corporative government models for a responsible AI and intern policies to mitigate biases on grounds of disability in every phase of the process. To this effect, the first step is to deploy governance and leadership structures of an ethical nature on AI. It is necessary to include social corporate responsibility postulates promoting wide-range changes in the matter of ethics on AI, and to involve and educate in the matter scientists, engineers and students. Everybody involved is encouraged to use their voices and influence to promote legislative changed oriented to a responsible AI.

It is important to finish by remarking that AI's –and its application's– extraordinary relevance and impact, which will shape increasingly shape our lives, require rigorous studies, very scant nowadays, to raise awareness and sustain useful reflections and recommendations to improve the design of AI systems and algorithms under an include prism, integrating the rights, interests, opinions, expectations and aspirations of people with disabilities. It is necessary to have data underlying both the positive uses of AI and algorithms in fields such as healthcare, education, employment or daily life to implement the rights stated by the CRDP, and its negative and discriminatory effects. In this regard, Guo *et al.* (2019, p.1) proposes an investigation agenda including the following points: (1) identifying the ways in which the inclusion of people with disabilities might affect AI, (2) testing the inclusion hypothesis to understand those scenarios in which there is discrimination and the measure in which bias mitigation techniques work, (3) creating sets of reference data capable of enabling inclusion, managing the ethical problems it could bring to vulnerable groups, and (4) trying new bias elimination and errors measurement techniques¹⁶, which intends to approach the differences between current methods and procedures in the use of algorithms and, generally, on the development of AI systems affecting negatively people with disabilities.

16. Such as data mining, a discipline comprehending computer science, law and social sciences, which tries to discover –by extracting data associating and classification rules– and prevent discrimination (Žliobaite, 2017).

And definitively, by saying that, without giving up the several advantages offered by AI and the use of algorithms, whether today or in the future, to people with disabilities particularly, it is important to approach the diverse and complex challenges that convergent technologies¹⁷ portray in the core of Ethics and Rights (Winston and Edelbach, 2011¹⁸) and that affect human rights (Asís in UC3M, 2013). Inclusion, diversity and equity are key factors to guarantee that machine learning systems do not create or perpetuate discrimination and, in that sense, equality and human dignity are the indisputable foundation in our democratic societies, and they must be the main reference in the development of an AI which considers universal prosperity and advance, specially for those groups who have traditionally been discriminated, ignored, o who present higher levels of vulnerability, such as people with disabilities. Only this way we will develop an inclusive AI who works for the wellbeing of everybody.

17. With this expression de Asís (UC3M, 2013) makes reference to the combination of transformative technologies such as nanoscience and nanotechnology, biotechnology, biomedicine and genetic engineering, information technology, cognitive sciences...

18. This work constitutes an very interesting analysis on how technological innovations create new ethical problems to our society, encouraging us to consider the social effects of technology on the daily life of people.

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