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D4.2: Analysis of the legal and human rights requirements for AI and robotics in and outside the EU

[WP4 – AI & Robotics: ethical, legal and social analysis]

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Abstract

This report presents the results of SIENNA research on legal developments and approaches to specific legal issues and human rights challenges related to artificial intelligence (AI) and robotics at the international, EU and national level (12 countries, EU and non-EU). The report broadly discusses the legal issues and human rights challenges of AI and robotics and analyses relevant international, EU and regional laws and human rights standards. It summarises and compares the results of the country studies on law, AI and robotics. It also discusses existing norms and standards and gaps and presents some recommendations and ways to overcome gaps. This report will feed into the forthcoming SIENNA work on enhancing the existing legal framework that will identify potential changes needed in dialogue with legislators and relevant committees.

Document history

Version	Date	Description	Reason for change	Distribution
V1.0	4 March 2019	First draft	Develop draft, comparative analysis and finalise.	SIENNA partners and reviewers.
V2.0	29 March 2019	Final version	Address feedback and comments from partners and reviewers.	SIENNA partners, European Commission.

Information in this report that may influence other SIENNA tasks

Linked task	Points of relevance
Task 5.6: Enhancement of the existing legal framework by networking with legislators and relevant committees about the three topics	Based on the results of Tasks 2.2, 3.2 and 4.2, task 5.2 will identify potential changes needed in the existing legal and human rights frameworks (i.e., international, EU and/or national) that might be necessary or desirable in order to create an environment in which the proposed codes of conduct could be implemented most effectively.
Task 6.2: Adapt and exploit methods developed in this project for legal analysis of emerging technologies in other domains	Task 6.2 will draw on the results included here (to analyse the possibilities for the general application of our approach for legal and human rights analysis, with reference to other types of future and emerging technologies)

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Executive summary

This report presents the results of SIENNA research on legal developments and approaches to specific legal issues and human rights challenges related to artificial intelligence (AI) and robotics at the international, EU and national level (12 countries, EU and non-EU). It broadly discusses the legal issues and human rights challenges of AI and robotics and analyses relevant international, EU and regional laws and human rights standards. It summarises and compares the results of the country studies on law, AI and robotics. It also discusses existing legal norms and standards, the gaps and challenges and presents some recommendations. This report will feed into the forthcoming SIENNA work on enhancing the existing legal framework that will identify potential changes needed in dialogue with legislators and relevant committees. It will help readers understand better the international, EU and selected countries legal developments and approaches to specific legal issues related to AI and robotics, become sensitised of the issues, and learn of parallel developments.

Legal issues and human rights challenges related to AI and robotics

There are a number of legal issues and human rights challenges related to AI and robotics. For **AI,** these include: lack of algorithmic transparency/transparency in automated decision-making; unfairness, bias, discrimination and lack of contestability; intellectual property issues; legal personhood issues (i.e., should/can AI systems can be deemed subjects of law); issues related to AI vulnerabilities in cybersecurity; issues related to impacts on the workplace and workers; privacy and data protection issues; liability issues related to damage caused by AI systems and applications. **Robotics-**related issues include: deception by robots, legal personhood for robots (should robots have a specific legal status), use of autonomous weapons to cause harm and make threats of harm, safety and control issues (particularly those affecting the right to life and/or bodily integrity), ascribing liability for malicious or non-malicious use, privacy invasions, replacement of human workers and job losses, consumer protection issues and intellectual property issues. Some of these are common problems of ICT technology in general - though facilitated or exacerbated by AI and robotics in some way. Other issues are novel and developing, e.g., legal personhood for AI systems and robots.

Many of the identified issues have **wide-ranging societal and human rights implications** and will affect a spectrum of human rights: data protection, equality, freedoms, human autonomy and self-determination of the individual, human dignity, human safety, informed consent, integrity, justice and equity, non-discrimination, privacy and self-determination. As AI and robotics technologies work closely together and with vast amounts of data, they will have **cross-over and multiplicative effects** that exacerbate legal and human rights issues related to them. Such issues might also amplify if the AI and robotics industry develops applications and systems without paying attention early-on in the design and development process to the impacts of such technologies on human rights and societal values.

Analysis of relevant international and regional laws and human rights standards

While some AI and/or robotics issues are well-covered in a general sense by the provisions in international law (though the law itself is not 'AI' or 'robotics' specific), other issues such as legal personhood for robots and consumer protection issues are not addressed in existing treaties. Some issues, by their nature, are naturally regulated at the regional or national level. There is much to be done in terms of advancing the discussion and actions on the legal regulation of AI and robotics. International legislators and the legal community should:

- **pay particular attention to the global impacts of AI and robotics** and especially the more vulnerable international communities that need protection would be left behind ('AI' divides),
- **determine the challenges** that need prioritising,
- set **clear ground rules on what AI and robotics applications are not permitted** under international human rights law,
- determine how international actors (state and multi-national corporations leading the AI and robotics revolutions) could practically implement their human rights obligations through **positive and negative incentives**,
- **determine how to address the negative impacts caused by the import and export** of AI/and or robotics technology.

Analysis of relevant EU laws and human rights standards

The ability of the EU legal framework to meet the challenges of AI and robotics is highly differentiated depending on the field. When it comes to the issues of algorithmic transparency and transparency in decision-making, bias and discriminations and personal data protection, it seems that the revised EU data protection framework may potentially offer some legal tools to accommodate these challenges and in this regard the EU may be considered a global trailblazer. However, its potential effectiveness largely depends on indirect guarantees that may or may not be used by individuals – for example a data subject exerting her or his right of access may use this right to detect algorithmic bias (as a first step to fight the bias), but this will require knowledge, skills, time and willingness.

The assessment of the applicability of existing EU safety and civil liability legislation is also nuanced. It remains open to discussion to what extent, in the context of AI and robotics, should the EU law expand to non-harmonised areas of civil liability for damages. There is some discrepancy between the EC and the European Parliament general approaches (the former is more cautious in its assessment of existing framework and in particular regarding the need to revise current legislation and the necessity to adopt new legislation, the latter seems to be much more critical about the sufficiency of current rules and is consequently to a larger extent pushing for a more proactive legislative approach, calling for revisions and adopting of new law).

There are fields, e.g., intellectual property of work created by AI, in which the current EU framework does not provide clear answers to some of the challenges (e.g., who could benefit from the work created by AI?) and at the same time there are no signs indicating that the EU institutions are looking for legal solutions in this respect.

Overall, the EU can be described as being proactive in the field of AI and robotics – various types of documents on the topic are being published almost on a monthly basis. To a certain extent, this may create a problem of coordination between different legislative and regulatory actors involved, including accommodating results of work of various Commission Expert Groups, Commission Staff working documents or studies commissioned by the European Parliament.

National comparative analysis

Legal academic discourses on AI and robotics are established in some countries, while in others they are in their infancy. In many of the studied countries, issues pertaining to AI and robotics have attracted the high-level attention of political parties. Overall, there were **no major or significant amendments in legislation bearing on constitutional or human rights** in direct response to AI and robotics

developments reported in the country research for the last five to ten years. In some countries, even in the future this is extremely unlikely to happen (such issues are projected to be left to the courts to adjudicate based on existing laws). With regard to plans to create or adopt new legislation to specifically regulate 'AI' or 'robotics', most countries have adopted a **cautious response** which has required or left existing laws to be creatively applied or existing regulatory bodies to step in. The national research revealed **no regulatory bodies have been created specifically to regulate AI or robotics, though there have been calls for these**. Case law identified focussed on various issues. This report also presents a comparative analysis of four specific legal questions addressed and reported in the national reports and identifies the convergences and the divergences along with any peculiarities – details are available in section 6.6.

Various **gaps and challenges** were identified based on the research carried out, e.g., few AI and robotics-specific regulations (other than those related to drones and self-driving cars – this is a challenge where issues with high impacts on individuals or society are not, or seen not to be addressed), lack of new regulatory bodies where existing ones fall short, sufficiency of existing national laws, lack of clarification on the application of existing laws, lack of legal academic debates in some countries, lack of judicial knowledge and training, greyness in the legal status of robots and automated systems. Concerns were raised regarding the usefulness of regulating AI and robotics through ethical frameworks and whether soft regulation could replace the legislative response. Concerns were also raised about algorithmic discrimination and the perpetuation of injustice and whether existing fundamental rights provisions are resilient to deal with issues of AI and robotics. Regional and European orders and institutions could play a vital role in helping countries to further evaluate and discuss such issues or present guidance to address such issues.

General discussion

Some common developments in international, EU and national law (studied in this report) are evident in terms of the existence of human rights laws and principles that can be extended or applied to AI and/or robotics. Naturally, none of the human rights instruments the research looked at, specifically address 'AI' or 'robotics', but their framework or principles could well be extended and applied to AI and/or robotics. At the international, EU and national levels there are also currently, no AI and/or robotics specific regulatory bodies (though this position might change in the future and there are many calls for the creation of these, whether justified or unjustified).

Though some exploratory work and policy views are evident, there **has not been a breakthrough headway in addressing legal personhood issues for AI and/or robotics at either of the three levels** – while this issue has been raised (and will continue to be at the forefront of legal debates for the near future), international or even regional-level agreement[1] on this (i.e., whether legal personhood should be offered to AI systems/robots and what form this should take) might be difficult or near impossible to achieve (given the political nature/sensitivity of the issue), also as such issues are largely regulated at the national level.

At all three levels (international, national and EU), the issue of **lack of clarity and guidance being provided by existing regulators** on how to apply or interpret existing legislation to address issues related to robotics and AI, has and is being addressed (incentivised by technological developments, investments, policy and regional/national strategic focuses on AI, for example).

[1] See Delcker, Janosch, "Europe divided over robot 'personhood', *Politico,* 11 April 2018 (*u*pdated 13 April 2018). https://www.politico.eu/article/europe-divided-over-robot-ai-artificial-intelligence-personhood/

The **state of legislative play differs at the three levels** given the diversity of countries, institutions, their mandates, powers and political will. Gaps and challenges are evident in all three cases (though the identification of these is limited). Some of these are common (e.g., lack of organised policies, parallel developments, discrepancy in approaches). Others are more specific and pertain to the region (e.g., in some cases a lack of legislation and guidance on applying existing legislation to AI and robotics is evident; in others, fast-paced and overwhelming developments are evident, e.g., the EU changes in data protection law and the availability of new tools and courses of legal action).

Some issues such as lethal autonomous weapons, cross-country AI-based surveillance, cryptocurrencies, need, and are best addressed by a global, international approach. Other issues are best dealt with at the regional or EU level (where agreement on principles and law can be reached e.g., as has occurred in the case of EU data protection law, though not without challenges). Ultimately, given the differences in political strategy (some countries are far more widely ambitious in their strategies and developments than others[2]), legal and ethical cultures, states of technological development, the use, transfer (import and export) and implementation of AI and robotics, complexity of issues, and the impacts on individuals, national law (primary[3] or secondary legislation[4]) and jurisprudence will be the better locale for the resolution of issues and impacts related to AI and/or robotics (though international/regional law might provide the framing). International or regional legislation that is not well-grounded or takes into account the diverse national environments might work to limit the development and adoption of and/or robotics in countries which will then, in turn, adversely affect a country's growth and progress.

At the EU-level, while there might be limited scope for a Regulation or Directive (unless this is scoped narrowly to fit a specific domain and application), Decisions, Recommendations and Opinions might be brought further into play to address legal issues of AI and robotics and provide guidance. At the national level, more legislative movements are expected (especially for specific applications where there are none as such technologies are not yet in use). Also, the convergence of AI and/or robotics technologies with the human might stretch the bounds of existing law, e.g., in terms of autonomy, identity and justice.

Conclusions

As AI and robotics technologies progress, there will be further (amplified) legal issues and impacts on human rights that will need further monitoring and research. AI is at the forefront of discussions at the moment, more than robotics, but we expect the convergence of the technologies (AI, robotics, IoT) will change this. The convergence of technologies and the human is also relevant and needs to be addressed – this is something that poses its own unique dilemma for the law.

The report recommends:

- Setting up a **global legal AI and/or robotics observatory** at the international (UN, Council of Europe) or EU-level with inputs from international and national rapporteurs to help systematically monitor and bring together not only legislation, but developments, case law, emerging legal issues and would inform future legislative work.

[2] E.g., China
[3] E.g., Acts of Parliament or Statutes.
[4] E.g., Statutory Instruments or Codes, Orders, Regulations, Rules.

- Carrying out a **regulatory impact assessment**[5] and considering adequately AI and/or robotics in context (and take into account their impacts – ethical, legal, social, economic, political, environmental) before legislating. Using **legal foresight** which is a rarely used tool, would well support such an exercise and advance legal discussions.

[5] An RIA (or simply Impact Assessment, IA) is "a systematic and mandatory appraisal of how proposed primary and-or secondary legislation will affect certain categories of stakeholders, economic sectors, and the environment." Radaelli, Claudio M. and Fabrizio De Francesco, "Regulatory impact assessment", in Robert Baldwin, Martin Cave, and Martin Lodge (eds.), *The Oxford Handbook of Regulation,* Oxford University Press, Oxford, pp. 279-301.

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List of acronyms/abbreviations

Abbreviation	Explanation
ACHR	American Convention on Human Rights/Pact of San Jose
ACRWC	African Charter on the Rights and Welfare of the Child
AI	Artificial intelligence
AI&R	Artificial intelligence and robotics
AU	African Union
CJEU	Court of Justice of the European Union
CoE	Council of Europe
CCW	Convention on Conventional Weapons
D	Deliverable
DoA	Description of Action
EC	European Commission
EDPS	European Data Protection Supervisor
EU	European Union
FRA	EU Agency for Fundamental Rights
GDPR	General Data Protection Regulation
IACAFDI	Inter-American Convention against All Forms of Discrimination and Intolerance
IACEFDPD	Inter-American Convention on the Elimination of all Forms of Discrimination Against Persons with Disabilities
IACPHROP	Inter-American Convention on Protecting the Human Rights of Older Persons
IACRRDRFI	Inter-American Convention against Racism, Racial Discrimination and Related Forms of Intolerance
IBA	International Bar Association
ICCPR	International Covenant on Civil and Political Rights
ICESCR	International Covenant on Economic, Social and Cultural Rights
ICJ	International Court of Justice
ICO	Information Commissioner's Office
ICT	Information and Communications Technology
IoT	Internet of Things
IP	Intellectual property
IPRs	Intellectual property rights

Abbreviation	Explanation
LARs	Lethal autonomous robotics
MEP	Member of European Parliament
OAS	Organization of American States
OAU	Organization of African Unity
STOA	Science and Technology Options Assessment
TEU	Treaty on European Union
TFEU	Treaty on the Functioning of the European Union
UAS	Unmanned aerial systems
UDHR	Universal Declaration of Human Rights
UNICRI	United Nations Interregional Crime and Justice Research Institute
US	United States
USA	United States of America
VDPA	Vienna Declaration and Programme of Action
WIPO	World Intellectual Property Organization

Table 1: List of acronyms/abbreviations

Glossary of terms

Term	Explanation
Artificial intelligence	The science and engineering of machines with capabilities that are considered intelligent (i.e., intelligent by the standard of *human* intelligence). Major applications of AI technology are in transportation, education, finance, industry, healthcare, marketing, management, telecommunications, entertainment and defence, amongst other fields. Important sub-fields of AI include: knowledge representation and automated reasoning, artificial neural networks, machine learning, computer vision, computer audition, natural language processing, expert systems, data mining, intelligent agent systems and automated planning, evolutionary computation. [SIENNA D4.1]
Automated decision-making	Decision based solely on automated processing, including profiling, which produces legal effects concerning a data subject or similarly significantly affects him or her (GDPR, Article 22 (1). It refers to individual decision-making made by automated means without any human involvement. Examples include: an online decision to award a loan; and a recruitment aptitude test which uses pre-programmed algorithms and criteria.[6] (Information Commissioner's Office)
Hard law	Authoritative rules backed by coercive force exercised at the national level by a legitimately constituted (democratic) nation-state and constituted in the supranational context by binding commitments

[6]Information Commissioner's Office (ICO), "Rights related to automated decision making including profiling". https://ico.org.uk/for-organisations/guide-to-the-general-data-protection-regulation-gdpr/individual-rights/rights-related-to-automated-decision-making-including-profiling/

Term	Explanation
	voluntarily entered into between sovereign states (typified by public international law[7]
Law	Encompasses both hard law and soft law (SIENNA D1.1, p.30)
Machine learning	A set of approaches within AI where statistical techniques and data are used to "teach" computer systems how to perform particular tasks, without these systems being explicitly programmed to do so. (SIENNA D4.1, p. 11.)
Regulation	The intentional use of authority to affect behaviour of a different party according to set standards. Law is one of the institutions for purposively attempting to shape behaviour and social outcomes, but there may be other means, including the market, social norms, and technology itself. Regulation can also mean a species of hard law, e.g., a type of EU legal act with a direct effect defined by Article 288 of the Treaty on the Functioning of the European Union[8] or, in some instances, a legal act adopted at the national level.
Regulatory bodies	Bodies that exercise regulatory or supervisory powers. E.g., regulatory agencies, watchdogs, Commissions.
Robotics	The field of science and engineering that deals with the design, construction, operation, and application of robots. Major applications of robots are in transportation, industry, healthcare, education, entertainment, space exploration, defence, retail, companionship, housekeeping and other areas. Important subfields of robotics were found to include: robot mechanics, robot sensing, robot control (including many subareas, such as robot learning, adaptive control, developmental robotics, evolutionary robotics, cognitive robotics, behaviour-based robotics, robotic mapping and planning), robot locomotion, bio-inspired and soft robotics, humanoid robotics, microrobotics, nanorobotics, beam robotics, cloud robotics, swarm robotics, telerobotics, social robotics and human-robot interaction. [SIENNA D4.1]
Soft law	Normative, non-binding instruments emanating from law-making bodies including resolutions, recommendations, guidelines, communications, notices etc. (public, top-down instruments). The lack of binding force is the main feature distinguishing soft from hard law.[9]

[7] Brownsword, Roger, Eloise Scotford, and Karen Yeung, "Law, Regulation and Technology: The Field, Frame, and Focal Questions", in Roger Brownsword, Eloise Scotford, and Karen Yeung (eds.), *The Oxford Handbook of Law, Regulation and Technology*, Oxford University Press, Oxford, 2017, pp. 3-40.

[8] According to this provision, "To exercise the Union's competences, the institutions shall adopt regulations, directives, decisions, recommendations and opinions. A regulation shall have general application. It shall be binding in its entirety and directly applicable in all Member States. A directive shall be binding, as to the result to be achieved, upon each Member State to which it is addressed, but shall leave to the national authorities the choice of form and methods. A decision shall be binding in its entirety. A decision which specifies those to whom it is addressed shall be binding only on them. Recommendations and opinions shall have no binding force."

[9] Goncales, Maria Eduarda, Maria Ines Gameiro, "Hard Law, Soft Law and Self-regulation: Seeking Better Governance for Science and Technology in the EU", Working paper, 2011. https://www.researchgate.net/publication/272351073_Hard_Law_Soft_Law_and_Self-regulation_Seeking_Better_Governance_for_Science_and_Technology_in_the_EU

Table 2: Glossary of terms

1. Introduction

1.1 Background and objectives

The objectives of the SIENNA legal research were pre-defined in the SIENNA Description of Action (DoA)[10] and further refined in the SIENNA Handbook.[11] Based on this, this research was guided by the following questions:

- What are the international and regional laws relevant to AI and robotics?
- Which rights of individuals (or groups) may potentially be affected by developments and what human rights standards may be relevant to consider in establishing methods to avoid or alleviate negative impacts and encourage positive impacts of those developments?
- To what extent are the existing legal frameworks adequate to deal with challenges posed by developments in AI and robotics?
- How might specific novel legal questions be solved in different jurisdictions according to different legal systems? What are the commonalities and differences between national legal systems with respect to those questions?
- What are the convergences, divergences and gaps in national and international legal orders for AI and robotics? What are the possible ways to overcome the gaps?

This report highlights the general legal and human rights issues of AI and robotics and explores whether these are covered by existing legislation. It also looks for gaps and the potential or actual solutions that are present. The report will provide inputs for forthcoming SIENNA work and help readers understand better the international, EU and select countries legal developments and approaches to specific legal issues related to AI and robotics. It will help them become sensitised of the issues and learn of parallel developments at different levels and countries.

1.2 Scope and limitations

The scope of the report is as pre-defined by the SIENNA project. The wide range of countries covered in the analysis of this report, the combination of general and specific questions for the study of national laws, and the thematic coordination of national research with the analysis of international and regional laws presented here will provide a useful overview of current state of the domestic law and legal responses to some of the key developments in AI and robotics.

[10] The DoA outlines the following objectives: map and study relevant norms from international and regional legal orders; explore how AI and robotics might affect the rights of individuals and groups; explore which human rights standards may be relevant to consider in establishing methods to avoid or alleviate negative impacts and encourage positive impacts; analyse selected EU and non-EU countries' legislations pertinent to AI and robotics; compare national laws against the international and regional norms and human rights standards; and analyse the findings in terms of their regulatory-design characteristics.

[11] SIENNA, *D1.1: The consortium's methodological handbook*, 30 April 2018.

The research was not without its challenges, especially given the limited resources and vastness of the topics themselves – AI and/or robotics and the differences in the jurisdictions. We did not examine all the legal issues of AI and robotics (covered in section 3 of this report) in the national legal comparative analysis but selected two issues per technological area (two for AI and two for robotics) for detailed analysis due to the limited scope of the task and resources available for the national studies.

1.3 Structure of the report

Section 2 outlines the approach followed, the methodology and research questions. Section 3 broadly discusses the legal issues and human rights challenges of AI and robotics. Section 4 presents an analysis of relevant international and regional laws and human rights standards. Section 5 presents an analysis of relevant EU laws and human rights standards. Section 6 presents an analysis of relevant national laws and human rights standards – this section summarises and compares the results of the country studies on law, AI and robotics. Section 7 discusses the findings and identifies convergences, divergences and gaps, followed by section 8 which discusses issues and ways to move forward at the international, EU and national levels. The Annexes of this report include a template and instructions for country studies and 12 country studies.

1.4 Related projects and relevant initiatives: examples

This report would like to acknowledge some prior and ongoing relevant work and initiatives.

One example is the EU-funded *RoboLaw* project (2012-2014) that investigated how emerging technologies in (bio-) robotics (e.g., bionics, neural interfaces and nanotechnologies) are regulated. The project presented "Guidelines on Regulating Robotics", with regulatory suggestions for the European Commission, to establish a solid framework of 'robolaw' in Europe.[12] Its key conclusions were framed around whether robots deserved a special case (treatment); the role of ethics in regulating emerging technologies; robotics, vulnerabilities and human capabilities; human enhancement technologies: reframing the debate and policy suggestions; liability rules as a tool to incentivise safety and spread desirable technologies; and the generalisation of the recommendations.

Another relevant initiative is the SHERPA project (2018-2021) which is investigating how smart information systems (SIS; the combination of artificial intelligence and big data analytics) impact ethics and human rights issues. SHERPA's work includes looking at regulatory options for SIS and coming up with terms of reference for a SIS regulator. There is also the PANELFIT project which will produce editable, open access Guidelines, validated by two data protection agencies that will serve as operational standards to reduce the ethical and legal issues posed by ICT technologies. PANELFIT will suggest possible concrete improvements to the current regulatory and governance framework, both at the EU and the national level. SIENNA, SHERPA and PANELFIT will share their findings with each other, and discuss outcomes. This deliverable (and forthcoming SIENNA legal work) will be particularly relevant to SHERPA work that will explore regulatory options to support the ethical and responsible development of smart information systems and the feasibility of a bespoke new regulator at the EU and/or Member State levels.

[12] See: Palmerini, Erica, et al, *D6.2 Guidelines on Regulating Robotics*, Robolaw, 22.9. 2014. http://www.robolaw.eu/RoboLaw_files/documents/robolaw_d6.2_guidelinesregulatingrobotics_20140922.pdf

There are other national level initiatives such as *Robotics & AI Law Society (RAILS)* in Germany,[13] NESTA's work on anticipatory regulation as an innovation method (UK)[14], and its pilot project 'Mapping AI Governance', an information resource about global governance activities related to artificial intelligence.[15]

This SIENNA report will complement the work of such projects and initiatives and feed into them.

2. Approach and methodology

The SIENNA Handbook (D1.1)[16] outlined the detailed methods and approaches for analysing international, regional and national laws.

This research used a combination of doctrinal, functional, and law-in-context methods to address the research questions. It first looked at and mapped the legal issues and human rights challenges relevant to AI and robotics. The mapping part of the legal research began with a literature review and included the relevant analysis of findings and results of SIENNA tasks 2.1, 3.1, 4.1 (state of the art reviews).

Approach to analysing international (including regional) law and to human rights analysis

In this phase of the analysis, using desktop research we studied relevant international norms and regional legal orders (such as the Council of Europe, the Organization of American States and African Union). First, we identified relevant organisations (i.e., bodies competent to enact hard and soft law), explored the scope of their mandate and competences that may provide ground for legal interventions affecting AI and robotics. Next, we mapped the relevant international sources of hard and soft law (i.e., legal documents, case law) and identified their nature (binding, non-binding), assessed their validity, relevance to AI and robotics and any gaps.

Approach to analysing EU law

The research included an analysis of the EU law. The analysis followed the above-outlined approach applied to the international law, but also took into account distinct features of the legal system of the European Union. In particular, in the light of principle of conferral, we explored the extent to which addressing the identified legal issues including human rights challenges lies within the EU competences and bore in mind that EU law uses terminology and legal concepts that are often peculiar to it.

Approach to national studies and comparative research

This research also analysed selected 12 EU and non-EU countries' legislations pertinent to AI and robotics (annexed to this report). The SIENNA team formulated guidelines for national reports (see

[13] http://ai-laws.org/en/. RAILS is working on a legal framework that facilitates technical developments, avoids discrimination, ensures equal treatment and transparency, protects fundamental democratic principles and ensures that all parties involved are adequately participating in the economic results of the digitalization.
[14] https://www.nesta.org.uk/feature/innovation-methods/anticipatory-regulation/
[15] https://www.nesta.org.uk/blog/mapping-global-approaches-ai-governance/
[16] SIENNA, *D1.1: The consortium's methodological handbook*, 30 April 2018.

Annex) which combined general[17] and specific questions[18] related to AI and robotics and an outline for the national reports (mirrored in the country reports). Relevant examples from a test study carried out by the Task 4.2 task leader were provided. Partners were invited to contribute in establishing the list of questions for analysis to ensure cultural differences were taken into consideration and there was a common understanding of all terms used. A first draft of the country reports was prepared and discussed at the SIENNA legal workshop in Warsaw, 8-9 November 2018 after which the country reports were finalised.

Based on the SIENNA Description of Action and the SIENNA Handbook, 12 countries were chosen and studied (eight European and four non-European to provide a wide range of differing norms and underlying values). As specified in the SIENNA Description of Action, the following countries were studied to ensure different regional representation: a Nordic state, Sweden; a Benelux state, The Netherlands; a British Isles state, the United Kingdom; a Central European state, Germany; three Mediterranean (and/or Alpine) countries, France, Greece and Spain; and an Eastern European state, Poland. The countries cover the civil code and common law states, and different constitutional traditions. For a wider comparative perspective beyond the EU, the partners considered coverage in terms of geography, culture, scientific developments and the protection of human rights and shortlisted the following countries for analysis (1) the United States, a North American country; (2) Brazil, a South American country; (3) China, an Asian country; and (5) South Africa, an African country.

Further details are presented in Section 6.1 and 6.2.

The outputs of national analysis ascertaining the state of law and current legal responses of the regulation of AI and robotics was then compared with each other (i.e., horizontal comparison), accounting for differences in each of the legal systems and values that underpin these systems.

3. Legal issues and human rights challenges of AI and robotics

There are a number of legal issues and human rights challenges related to AI and robotics. This section presents a brief (non-exhaustive) overview of such issues[19] and challenges based on a preliminary literature review of AI and robotics documents addressing legal aspects, i.e., articles in academic and legal practitioner journals, books, legal commentaries or legal policy studies (from last five to ten years). This review was a starting point to help determine which specific legal issues are being discussed and debated in relation to AI and robotics and should be further be explored in SIENNA and particularly investigated in the country studies (See report annex).

As outlined in SIENNA *D4.1, State of the art review* on AI and robotics, "there exists a degree of overlap between AI and robotics".[20] However, though they might converge and be interconnected (e.g., artificially intelligent robots or software robots) and present similar challenges, they are each, distinct technologies, and serve different purposes. This is why we chose to study them individually where feasible, which was also a great help to disentangle issues. We recognise that many of these issues are inter-related (e.g., transparency, fairness, accountability) and might not operate in silos.

[17] Related to legal developments in the country.
[18] Outlined further in the document (at the end of the issues analysis).
[19] The order of presentation of the issues is not reflective of their importance.
[20] SIENNA, *D4.1 State of the art review: AI and robotics*, 2018.

3.1 Artificial intelligence

Our literature review identified the following key issues: lack of algorithmic transparency/transparency in automated decision-making; unfairness, bias, discrimination and lack of contestability; intellectual property issues; legal personhood issues (i.e., should/can AI systems can be deemed subjects of law); issues related to AI vulnerabilities in cybersecurity; issues related to impacts on the workplace and workers; privacy and data protection issues; liability issues related to damage caused by AI systems and applications.

We briefly explore these below (noting that some issues cross-over and might be common to both AI and robotics)

Lack of algorithmic transparency/transparency in automated decision- making

The lack of algorithmic transparency[21] is a significant issue that is at the forefront of legal discussions on AI.[22] This issue has become significant; as Cath highlights, the ' proliferation of AI in high-risk areas, pressure is mounting to design and govern AI to be accountable, fair and transparent."[23] As pointed out by Mittelstadt et al, "the primary components of transparency are *accessibility* and *comprehensibility* of information. Information about the functionality of algorithms is often intentionally poorly accessible".[24] Though it has its limitations[25], transparency is important as a part of accountability. Transparency is stressed in the GDPR in relation to personal data processing and providing individuals with appropriate information and control.

[21] Some recent publications include: Lepri, Bruno, et al., "Fair, transparent, and accountable algorithmic decision-making processes", *Philosophy & Technology*, Vol. 31, No. 4, 2018, pp. 611-627; Coglianese, Cary, and David Lehr, "Transparency and algorithmic governance," *Administrative Law Review,* 2018, pp. 18-38; Bodo, B., et al, "Tackling the Algorithmic Control Crisis-the Technical, Legal, and Ethical Challenges of Research into Algorithmic Agents", *Yale Journal of Law and Technology*, Vol. 19. No. 1, 2018, pp. 3.

[22] E.g., EDPS, "Artificial Intelligence, Robotics, Privacy and Data Protection, Background document for the 38th International Conference of Data Protection and Privacy Commissioners, 2016. https://edps.europa.eu/data-protection/our-work/publications/other-documents/artificial-intelligence-robotics-privacy-and_en; Pasquale, Frank, *The Black Box Society, The Secret Algorithms That Control Money and Information,* Harvard University press, 2015.

[23] Cath, Corinne, "Governing artificial intelligence: ethical, legal and technical opportunities and challenges", *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 2018. https://royalsocietypublishing.org/doi/full/10.1098/rsta.2018.0080

[24] Mittelstadt, Brent Daniel, Patrick Allo, Mariarosaria Taddeo, Sandra Wachter, and Luciano Floridi, "The ethics of algorithms: Mapping the debate", *Big Data & Society* 3, no. 2, 2016. https://journals.sagepub.com/doi/full/10.1177/2053951716679679

[25] Ananny, M., & K. Crawford, "Seeing without knowing: Limitations of the transparency ideal and its application to algorithmic accountability", *New media & society*, December 2016. http://journals.sagepub.com/doi/abs/10.1177/1461444816676645?journalCode=nmsa

Unfairness, bias and discrimination and lack of contestability

Unfairness[26], bias[27] and discrimination[28] repeatedly pop up as issues and have been identified as a major challenge[29] related to the use of algorithms and automated decision-making systems (e.g., to make decisions related to health[30], employment, credit, criminal justice[31], insurance).

A 2018 focus paper from the EU Agency for Fundamental Rights (FRA) outlines the potential for discrimination against individuals via algorithms, calls it a "pressing challenge" and states that "the principle of non-discrimination, as enshrined in Article 21 of the Charter of Fundamental Rights of the European Union, needs to be taken into account when applying algorithms to everyday life".[32] It cites examples with potential for discrimination such as: automated selection of candidates for job interviews, use of risk scores in creditworthiness or in trials.

In 2016, an EU Parliament report on the fundamental rights implications of big data: privacy, data protection, non-discrimination, security and law-enforcement,[33] stressed that "because of the data sets and algorithmic systems used when making assessments and predictions at the different stages of data processing, big data may result not only in infringements of the fundamental rights of individuals, but also in differential treatment of and indirect discrimination against groups of people with similar characteristics, particularly with regard to fairness and equality of opportunities for access to education and employment, when recruiting or assessing individuals or when determining the new consumer habits of social media users" and called on the European Commission, the Member States and the data protection authorities "to identify and take any possible measures to minimise algorithmic discrimination and bias and to develop a strong and common ethical framework for the transparent processing of personal data and automated decision-making that may guide data usage and the ongoing enforcement of Union law".[34]

A related issue is the lack of contestability. Edwards and Veale, highlight, a connected issue – the lack of contestability - in relation to algorithmic systems, i.e., the "lack of an obvious means to challenge

[26] Smith, Lauren, "Unfairness by Algorithm: Distilling the Harms of Automated Decision-Making", Future of Privacy Forum, 2017. https://fpf.org/2017/12/11/unfairness-by-algorithm-distilling-the-harms-of-automated-decision-making/

[27] Courtland, Rachel, "Bias detectives: the researchers striving to make algorithms fair", *Nature,* 20 June 2018. https://www.nature.com/articles/d41586-018-05469-3; Hajian, Sara, Francesco Bonchi, and Carlos Castillo, "Algorithmic bias: From discrimination discovery to fairness-aware data mining", *Proceedings of the 22nd ACM SIGKDD international conference on knowledge discovery and data mining*, ACM, 2016; Baeza-Yates, Ricardo, "Data and algorithmic bias in the web," *Proceedings of the 8th ACM Conference on Web Science*, 2016.

[28] Smith, Lauren, op cit., 2017.

[29] See Hacker, Philipp, "Teaching fairness to artificial intelligence: Existing and novel strategies against algorithmic discrimination under EU law," *Common Market Law Review, Vol.* 55, Iss. 4, 2018, pp. 1143-1185.

[30] See Danks, David, and Alex John London, "Algorithmic bias in autonomous systems," *Proceedings of the 26th International Joint Conference on Artificial Intelligence*", AAAI Press, 2017, p.4. https://www.cmu.edu/dietrich/philosophy/docs/london/IJCAI17-AlgorithmicBias-Distrib.pdf

[31] E.g., Berk, R. A., "Accuracy and fairness for juvenile justice risk assessments", *Journal of Empirical Legal Studies*, 2019, https://crim.sas.upenn.edu/sites/default/files/Berk_FairJuvy_1.2.2018.pdf

[32] EU Agency for Fundamental Rights (FRA), *#BigData: Discrimination in data-supported decision making*, May 2018. http://fra.europa.eu/en/publication/2018/big-data-discrimination

[33] http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+REPORT+A8-2017-0044+0+DOC+XML+V0//EN

[34] Ibid.

them when they produce unexpected, damaging, unfair or discriminatory results".[35] In similar vein, Hildebrandt also highlights how "the opacity of ML systems may reduce both the accountability of their 'owners' and the contestability of their decisions".[36]

Intellectual property issues

Intellectual property rights are part of the Universal Declaration of Human Rights (UDHR)[37], the International Covenant on Economic, Social and Cultural Rights (ICESCR)[38], the International Covenant on Civil and Political Rights (ICCPR)[39] and the Vienna Declaration and Programme of Action (VDPA) 1993. Such rights they have a "human rights character" and "have become contextualised in diverse policy areas".[40] There are intellectual property issues related to works created by AI (e.g., who owns AI generated works or inventions? Should AI's inventions be considered prior art? Who owns the dataset from which an artificial intelligence must learn? Who should be liable for creativity and innovation generated by AI, if they impinge upon others' rights or other legal provisions?[41]. Many of these have not been answered conclusively and need further research and exploration.

Legal personhood issues: should/can AI systems can be deemed subjects of law?

There is ongoing debate about whether AI (and/or robotics systems) "fit within existing legal categories or whether a new category should be created, with its own specific features and implications".[42] Čerka et al, ask whether artificial intelligence systems can be deemed subjects of law.[43] Bryson considers conferring legal personhood on purely synthetic entities will become a very real legal possibility, but thinks such "legislative action would be morally unnecessary and legally troublesome".[44] In her review of the utility and history of legal fictions of personhood and after discussing the salient precedents where such fictions resulted in abuse or incoherence, Bryson argues that, "While AI legal personhood may have some emotional or economic appeal, so do many superficially desirable hazards against which the law protects us".[45] Brożek and Jakubiec investigated the issue of legal responsibility of autonomous machines and argue that "autonomous machines cannot be granted the status of legal agents."[46]

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[35] Edwards, Lilian and Veale, Michael, "Slave to the algorithm? Why a 'right to an explanation' is probably not the remedy you are looking for", *Duke Law and Technology Review*, 16 (1), 2017, pp. 1-65.

[36] Hildebrandt, Mireille, "The new imbroglio. living with machine algorithms", *The Art of Ethics in the Information Society, 2*016.

[37] I.e., Article 27.

[38] Article 15.

[39] Article 19.

[40] WIPO, "Intellectual Property and Human Rights", proceedings of a panel discussion, organized by the World Intellectual Property Organization in collaboration with the Office of the United Nations High Commissioner for Human Rights, on 9 November 1998.
http://www.wipo.int/edocs/pubdocs/en/intproperty/762/wipo_pub_762.pdf

[41] CEIPI, "Artificial Intelligence and Intellectual Property". http://www.ceipi.edu/en/training-seminars/artificial-intelligence-and-intellectual-property/

[42] See for instance, European Parliament resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)), *Official Journal of the European Union,* C 252/239, 18.7.2018.

[43] Čerka, Paulius, Jurgita Grigienė, and Gintarė Sirbikytė, "Is it possible to grant legal personality to artificial intelligence software systems?" *Computer Law & Security Review*, Vol. 33, 5, 2017, pp. 685-699.

[44] Bryson, Joanna J., Mihailis E. Diamantis, and Thomas D. Grant, "Of, for, and by the people: the legal lacuna of synthetic persons", *Artificial Intelligence and Law,* Vol. 25, 3, 2017, pp. 273-291.

[45] Ibid.

[46] Brożek, Bartosz, and Marek Jakubiec, "On the legal responsibility of autonomous machines", *Artificial Intelligence and Law* 25, 3, 2017, pp. 293-30.

Issues related to AI vulnerabilities in cybersecurity

A RAND perspectives report[47] highlights various national security issues related to AI, for example, fully automated decision-making leading to costly errors and fatalities, the use of AI weapons without human mediation, issues related to AI vulnerabilities in cybersecurity, how the application of AI to surveillance or cybersecurity for national security opens a new attack vector based on 'data diet vulnerability', the use of network intervention methods by foreign-deployed AI, larger scale and more strategic version of current advanced targeting of political messages on social media etc. The RAND report[48] also identifies domestic security-related issues, for example, (growing) deployment of artificial agents for the surveillance of civilians by governments (e.g., predictive policing algorithms)- these are called out for their potential to adversely impact fundamental citizens' rights. The EU-funded SHERPA project[49] is also exploring issues related to AI and cybersecurity.

Issues related to impact on the workplace and workers

An IBA Global Employment Institute report highlights the impact of AI and robotics and their impact on the workplace.[50] Some issues highlighted are: preparation of future workers by equipping them with the required skills, need to adapt the education system, creation of new job structures and new types of jobs, dismissal of employees, inequality in the 'new' job market, integration of untrained workers in the 'new' job market, labour relations (i.e., possible implications for union activities and collective bargaining aspects, challenges for employee representatives, changes in the structure of unions), health and safety issues, impact on working time, impact on remuneration (changes, pensions), social security issues etc. The report suggests that "legislators are already lagging behind and the gap between reality and legal framework is growing".[51] All the identified issues not only have significant human rights impact potential but also raise ethical issues and dilemmas that might not easily be resolved. These issues are especially relevant considering their potential to impact a large number of people (especially the working classes) in many different ways.

Privacy and data protection issues

Legal scholars and data protection enforcement authorities opine that AI poses big privacy and data protection challenges.[52] The challenges relate to informed consent, surveillance, data protection rights of individuals (e.g., right of access to personal data, right to prevent processing likely to cause damage or distress, right not to be subject to a decision based solely on automated processing etc). Wachter and Mittelstadt highlight how "concerns about algorithmic accountability are often actually concerns about the way in which these technologies draw privacy invasive and non-verifiable inferences about us that we cannot predict, understand, or refute".[53] They state, "individuals are granted little control

[47] Osoba, Osonde A. and William Welser IV, *The Risks of Artificial Intelligence to Security and the Future of Work*, RAND Corporation Santa Monica, 2017. https://www.rand.org/pubs/perspectives/PE237.html
[48] Osoba, Welser, op. cit., 2017.
[49] https://www.project-sherpa.eu/about/
[50] International Bar Association, Global Employment Institute, *Artificial Intelligence and Robotics and Their Impact on the Workplace,* April 2017. https://www.ibanet.org/Document/Default.aspx?DocumentUid=c06aa1a3-d355-4866-beda-9a3a8779ba6e
[51] Osoba, op. cit., 2017.
[52] Gardner, Stephen, "AI poses big privacy and data protection challenges", *Bloomberg Law News*, 26 oct 2016. https://www.bna.com/artificial-intelligence-poses-n57982079158/
[53] Wachter, Sandra, and B. D. Mittelstadt, "A right to reasonable inferences: re-thinking data protection law in the age of Big Data and AI", *Columbia Business Law Review*, 2019. https://ora.ox.ac.uk/objects/uuid:d53f7b6a-981c-4f87-91bc-743067d10167/download_file?file_format=pdf&safe_filename=Wachter%2Band%2BMittelstadt%2B2018%2B-

and oversight over how their personal data is used to draw inferences about them" and call for a new data protection 'right to reasonable inferences', to "help close the accountability gap currently posed 'high risk inferences' , meaning inferences that are privacy invasive or reputation damaging and have low verifiability in the sense of being predictive or opinion-based".[54]

The EDPS, *Artificial Intelligence, Robotics, Privacy and Data Protection Background document for the 38th International Conference of Data Protection and Privacy Commissioners*, 2016,[55] highlights the potential for increase in privacy implications and powerfulness of surveillance possibilities. One key question raised was how data protection authorities could/were appropriately supervising organisations using intensively big data, AI and machine learning.

The UK Information Commissioner's Office (ICO)'s discussion paper on "Big data, artificial intelligence, machine learning and data protection" (2017) examines the implications of big data, artificial intelligence (AI) and machine learning for data protection, and explains the ICO's views on these (i.e., that the benefits will not be achieved at the expense of data privacy rights; and meeting data protection requirements will benefit both organisations and individuals).[56]

Liability issues related to damage caused by AI

Liability issues might present in the form of civil liability or criminal liability. Kingston discusses AI and legal liability – both whether criminal liability could ever apply, to whom it might apply, and, under civil law, whether an AI program is a product that is subject to product design legislation or a service to which the tort of negligence applies.[57] Hallevy discusses the criminal liability of AI entities, i.e., responsibility for harm caused.[58] Hallevy also explores whether an AI entity itself be criminally liable (beyond the criminal liability of the manufacturer, end-user or owner, and beyond their civil liability) and suggests that the imposition of criminal liability upon AI entities for committing intellectual property offenses is quite feasible, and proposes solutions for sentencing AI entities.[59]

In certain civil law jurisdictions, many liability issues are handled through strict liability. However, Bathee outlines "Strict liability is also a poor solution for the problem because if one cannot foresee the solutions an AI may reach or the effects it may have, one also cannot engage in conduct that strict

%2BA%2Bright%2Bto%2Breasonable%2Binferences%2B-%2BVersion%2B6%2Bssrn%2Bversion.pdf&type_of_work=Journal+article

[54] Ibid.

[55] EDPS, "Artificial Intelligence, Robotics, Privacy and Data Protection, Background document for the 38th International Conference of Data Protection and Privacy Commissioners, 2016. https://edps.europa.eu/data-protection/our-work/publications/other-documents/artificial-intelligence-robotics-privacy-and_en

[56] ICO, *Big data, artificial intelligence, machine learning and data protection*, Version: 2.2, 2017. https://ico.org.uk/media/for-organisations/documents/2013559/big-data-ai-ml-and-data-protection.pdf

[57] Kingston, J.K.C., "Artificial intelligence and legal liability", in *International Conference on Innovative Techniques and Applications of Artificial Intelligence*, Springer, Cham, Dec 2016, pp. 269-279.

[58] Hallevy, Gabriel, "The Criminal Liability of Artificial Intelligence Entities - from Science Fiction to Legal Social Control," *Akron Intellectual Property Journal*, Vol. 4, Iss. 2, Article 1, 2010. http://ideaexchange.uakron.edu/akronintellectualproperty/vol4/iss2/1

[59] Hallevy, Gabriel, "AI v. IP - Criminal Liability for Intellectual Property IP Offenses of Artificial Intelligence AI Entities", 17 Nov 2015. http://dx.doi.org/10.2139/ssrn.2691923

liability is designed to incentivize, such as taking necessary precautions or calibrating the level of financial risk one is willing to tolerate".[60]

Accountability for harms

In the "ART of AI", Dignum explains accountability as "the need to explain and justify one's decisions and actions to its partners, users and others with whom the system interacts. To ensure accountability, decisions must be derivable from, and explained by, the decision-making algorithms used". [61] Dignum further clarifies that "accountability in AI requires both the function of guiding action (by forming beliefs and making decisions), and the function of explanation (by placing decisions in a broader context and by classifying them along moral values)".[62]

Wachter, Mittelstadt, and Floridi, suggest that "American and European policies now appear to be diverging on how to close current accountability gaps in AI".[63] Legal accountability mechanisms for AI harms might take the form of a 'right to explanation'[64], data protection and information and transparency safeguards, auditing, or other reporting obligations. Doshi-Velez et al[65], review contexts in which explanation is currently required under the law and outline technical considerations that must be considered if we desired AI systems that could provide kinds of explanations that are currently required of humans.

In addition to the above listed AI issues, the Council of Europe study on the human rights dimensions of automated data processing techniques (in particular algorithms) and possible regulatory implications,[66] identified the following impacts of algorithms on human rights – these include fair trial and due process, freedom of expression, freedom of assembly and association, effective remedies, social rights and access to public services, rights to free elections[67] etc. As AI and robotics technologies progress, we expect there will be further legal issues and impacts on human rights that will need further monitoring and research.

3.2 Robotics

This section covers various issues raised by robots/pertaining to robotics applications as identified by

[60] Bathaee, Y., "The artificial intelligence black box and the failure of intent and causation", *Harvard Journal of Law & Technology*, *31*(2), pp. 889- 937, p. 894.
[61] Dignum, Virginia, "The ART of AI — Accountability, Responsibility, Transparency", *Medium,* 4 March 2018. https://medium.com/@virginiadignum/the-art-of-ai-accountability-responsibility-transparency-48666ec92ea5
[62] Dignum, op., cit., 2018.
[63] Wachter, S., Mittelstadt, B., & Floridi, L., "Transparent, explainable, and accountable AI for robotics", *Science Robotics*, 2(6), 2017, eaan6080.
[64] Edwards, L., M. Veale, "Enslaving the algorithm: from a 'right to an explanation' to a 'right to better decisions'?" *IEEE Security and Privacy Magazine*, Jan 2018; Edwards, Lilian, and Michael Veale, "Slave to the Algorithm? Why a "Right to an Explanation" is Probably Not the Remedy You Are Looking For", *Duke Law and Technology Review* Vol. 16, 18, 2017.
[65] Doshi-Velez, Finale, Mason Kortz, Ryan Budish, Chris Bavitz, Sam Gershman, David O'Brien, Stuart Schieber, James Waldo, David Weinberger, and Alexandra Wood, "Accountability of AI Under the Law: The Role of Explanation" *arXiv preprint arXiv:1711.01134*, 2017. https://arxiv.org/pdf/1711.01134.pdf
[66] Council of Europe, *Study on the human rights dimensions of automated data processing techniques (in particular algorithms) and possible regulatory implications*, Prepared by the committee of experts on internet intermediaries (MSI-NET), March 2018. https://rm.coe.int/study-hr-dimension-of-automated-data-processing-incl-algorithms/168075b94a
[67] Recalling the concerns raised by deep fakes and AI-enabled disinformation campaigns.

our literature review. These include: deception by robots, legal personhood for robots (should robots have a specific legal status), use of autonomous weapons to cause harm and make threats of harm, safety and control issues (particularly those affecting the right to life and/or bodily integrity), ascribing liability for malicious or non-malicious use, privacy invasions, replacement of human workers and job losses, consumer protection issues and intellectual property issues. We briefly discuss these next.

Deception by robots

Deception[68] has been identified as an emerging issue related to robotics (e.g., camouflage robots) with huge impact on vulnerable populations.[69] As Zawieska highlights, "Some researchers focus on purposefully deceptive robots. This is because deception is seen as a useful technique widely used by humans, and animals, that helps achieving specific goals".[70] Hartzog, also highlights how this makes "marketing robots a ripe opportunity for deception because consumers are primed to believe".[71] Further, "not all deception is actionable and not all deceptions are lawbreakers. A modest amount of inaccuracy is allowable, if not encouraged, under general principles of marketing and the messiness of human interaction. Many robots that end up misleading people might simply be engaged in trade puffery or common data analytics, similar to how a salesperson relies upon context and cues to tailor a strategy to best close the deal".[72] While deception by robots may be perfectly acceptable in some contexts and domains, in others it would not be. E.g., Deception by a robot might fall foul of law which prohibits which prohibits unfair and deceptive trade practices.[73]

Legal personhood for robots: should robots have a specific legal status?

This is an old debate; Solum in 1992,[74] raised theoretical questions and discussed whether an artificial intelligence become a legal person and took up the question whether cognitive science might have implications for current legal and moral debates over the meaning of personhood. There has been renewed policy interest in this issue of late. However, it has been increasingly in focus at the EU-level. The EU Parliament report (2017) with recommendations to the Commission on Civil Law Rules on Robotics expressly called upon the European Commission "when carrying out an impact assessment of its future legislative instrument, to explore, analyse and consider the implications of all possible legal solutions" including creating a specific legal status for robots in the long run, so that at least the most

[68] For a taxonomy of robot deception, see Shim, Jaeeun, and Ronald C. Arkin, "A taxonomy of robot deception and its benefits in HRI", *2013 IEEE International Conference on Systems, Man, and Cybernetics*. IEEE, 2013. The listed cases include deceiving human for deceiver robot's own benefit using physical interactions, deceiving other robot or nonhuman for deceiver robot's own benefit using physical interactions, deceiving human for deceived human's benefit using physical interactions, deceiving other robot or nonhuman for deceived other's benefit using physical interactions, deceiving humans for deceiver robot's own benefit using behavioral interactions, deceiving other robots or nonhumans for deceiver robot's self-benefit using behavioral interactions, deceiving humans for deceived human's benefit using behavioral interactions and deceiving other robots or nonhumans for deceived other's benefit using behavioral interactions.

[69] Robots may have deception and discrimination abilities built in that might affect human dignity. See the example of the Paro seal robot. http://doc.gold.ac.uk/aisb50/AISB50-S17/AISB50-S17-Sharkey-Paper.pdf

[70] Zawieska, Karolina, "Deception and manipulation in social robotics", *Workshop on The Emerging Policy and Ethic of Human-Robot Interaction at the 10th ACM/IEEE International Conference on Human-Robot Interaction (HRI2015)*. http://www.openroboethics.org/hri15/wp-content/uploads/2015/02/Mf-Zawieska.pdf

[71] Hartzog, Woodrow, "Unfair and deceptive robots." *Md. L. Rev.*74, 2014, pp. 785. https://heinonline.org/HOL/LandingPage?handle=hein.journals/mllr74&div=41&id=&page=

[72] Hartzog, op. cit., 2014.

[73]Ibid.

[74] Solum, Lawrence B., "Legal personhood for artificial intelligences", *NCL Rev.* 70, 1992, p. 1231- 1287.

sophisticated autonomous robots could be established as having the status of electronic persons responsible for making good any damage they may cause, and possibly applying electronic personality to cases where robots make autonomous decisions or otherwise interact with third parties independently".[75]

An Open Letter by artificial intelligence and robotics experts, industry leaders, law, medical and ethics experts to the European Commission, strongly recommends that "from an ethical and legal perspective, creating a legal personality for a robot is inappropriate whatever the legal status model…".[76]

In 2009, Schaerer, Kelley, and Nicolescu proposed a framework for 'Robots as Animals' in which robots are analogised to domesticated animals for legal purposes in disputes about liability.[77] Subsequently, Kelley et al, examined the laws concerning domesticated animals in countries in Europe, Asia, and North America and used their analysis to expand the framework to better reflects the established norms of several nations and balance the competing interests of producers and consumers of robot technology.[78]

Use of autonomous weapons to cause harm and make threats of harm

Discussions on harm or threats of harm from robots have been framed around 'autonomous weapons'[79] 'armed drones'[80], 'drone warfare' 'killer robots'[81]. There is much debate in the area of the law of armed conflict surrounding these. The connected issues relate to dual-use concerns, lethality, transparency in deployment and use, lawfulness or legal basis, operational responsibility, etc. In 2018 the *European Parliament Resolution on autonomous weapons systems*[82] highlighted that a number of countries, publicly funded industries and private industries are reportedly researching and developing lethal autonomous weapon systems and their potential to fundamentally change warfare by prompting an unprecedented and uncontrolled arms race. It also highlights how the use of lethal

[75] European Parliament Committee on Legal Affairs, Report with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)), 27.1.2017.http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+REPORT+A8-2017-0005+0+DOC+XML+V0//EN

[76] Open Letter to the European Commission Artificial Intelligence and Robotics, 5 April 2018. https://g8fip1kplyr33r3krz5b97d1-wpengine.netdna-ssl.com/wp-content/uploads/2018/04/RoboticsOpenLetter.pdf

[77] Schaerer, E., R. Kelley, M. Nicolescu, "Robots as Animals: A Framework for Liability and Responsibility in Human-Robot Interactions," in *Proc. of the International Symposium on Robot and Human Interactive Communication (RO-MAN '09)*, September 2009.

[78] Kelley, Richard, et al., "Liability in robotics: an international perspective on robots as animals", *Advanced Robotics, Vol.* 24, 13, 2010, pp. 1861-1871

[79] Gubrud, Mark, "Why Should We Ban Autonomous Weapons?", *IEEE Spectrum*, 1 June 2016.

[80] See, for example, Martins, Bruno Oliveira, "The European Union and armed drones: framing the debate.", *Global Affairs*, 2015, pp. 247-250; Dorsey, J. & C. Paulussen, "A common European position on armed drones? Charting EU member states' views on questions of counterterrorism uses of force", *Global Affairs*, 1(3), 2015, pp. 277–283; Dworkin, A., "Drones and targeted killing: Defining a European position", *Policy Brief*, European Council on Foreign Relations", 2013; Dworkin, A., "The EU and armed drones – epilogue", *Global Affairs*, 1(3), 2015, pp. 293–297.

[81] See, e.g., Krishnan, Armin, *Killer robots: Legality and ethicality of autonomous weapons,* Ashgate, Aldershot, 2009; Müller, Vincent C. and Thomas W. Simpson, "Killer robots: Regulate, don't ban", *University of Oxford, Blavatnik School of Government Policy Memo,* November 2014, pp. 1-4.

[82] European Parliament resolution of 12 September 2018 on autonomous weapon systems (2018/2752(RSP)), 12 September 2018 – Strasbourg. http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P8-TA-2018-0341+0+DOC+XML+V0//EN&language=EN

autonomous weapon systems raises fundamental ethical and legal questions of human control especially where machines and robots cannot make human-like decisions involving the legal principles of distinction, proportionality and precaution. Concerns were expressed in relation to an arms race in such weapons and threats from their malfunctioning or cyberattacks.[83].

Safety and control issues of robots particularly those affecting the right to life and/or bodily integrity
Robots present safety and control issues that might adversely affect human life and well-being[84]. For instance, medical robots might compromise patient care, cause injury or death via device or instrument malfunctions.[85] Robotics prosthesis might be risky and unsafe. As Hersch outlines, in the case of assistive robots, "additional safety precautions, as well as an even higher level of reliability than for industrial robots"[86] are needed. As recognised by an EU Parliament STOA report, multiple safeguards are needed "to ensure that the robot itself is safe for users and does not infringe on their right to physical integrity".[87]

Ascribing liability for malicious or non-malicious use of robots
Ascribing liability for malicious[88] and non-malicious[89] use of robots, e.g., autonomous vehicles/driverless cars or autonomous weapons systems is another pertinent issue in play. At the EU[90] and national level, liability of autonomous vehicles is being addressed.

Gless, Silverman and Weigend discuss criminal responsibility in relation to robots and self-driving cars and argue in favour of limiting the criminal liability of operators to situations where they neglect to undertake reasonable measures to control the risks emanating from robots.[91] Zornoza et al[92] propose

[83] See also European Parliament resolution on the use of armed drones, 25.02.2014 [adopted 27.02.2014] (2014/2567(RSP)). http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+MOTION+P7-RC-2014-0201+0+DOC+XML+V0//EN

[84] Vasic, Milos, and Aude Billard, "Safety issues in human-robot interactions", *2013 IEEE International Conference on Robotics and Automation*, IEEE, 2013. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.299.826&rep=rep1&type=pdf

[85] See for instance, Alemzadeh, Homa, Jaishankar Raman, Nancy Leveson, Zbigniew Kalbarczyk, and Ravishankar K. Iyer, "Adverse events in robotic surgery: a retrospective study of 14 years of FDA data", *PLoS One* 11, no. 4, 2016. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0151470

[86] Hersh, Marion, "Overcoming Barriers and Increasing Independence – Service Robots for Elderly and Disabled People", *International Journal of Advanced Robotic Systems*, 2014. http://eprints.gla.ac.uk/101946/1/101946.pdf

[87] European Parliamentary Research Service Scientific Foresight Unit (STOA), *Scientific Foresight study, Ethical Aspects of Cyber-Physical Systems*, June 2016. http://www.europarl.europa.eu/RegData/etudes/STUD/2016/563501/EPRS_STU(2016)563501_EN.pdf

[88] Example of one type of malicious use is cyberattacks on industrial, commercial or domestic robots by hackers to spy on people or cause other harms. https://teiss.co.uk/special-reports/industrial-domestic-robots-vulnerable-cyber-attacks/

[89] For example, caused by accident or where for example one driverless cars acts in a way that causes some harm to avoid other harm.

[90] European Parliament, *A common EU approach to liability rules and insurance for connected and autonomous vehicles: European Added Value Assessment*, Feb 2018. http://www.europarl.europa.eu/RegData/etudes/STUD/2018/615635/EPRS_STU(2018)615635_EN.pdf

[91] Gless, S., E. Silverman, & T. Weigend, "If Robots cause harm, Who is to blame? Self-driving Cars and Criminal Liability" *New Criminal Law Review: In International and Interdisciplinary Journal*, *19*(3), 2016, pp. 412-436

[92] Zornoza, Alejandro, et al, "Robots Liability: A Use Case and a Potential Solution", *Robotics-Legal, Ethical and Socioeconomic Impacts InTech*, 2017. https://www.intechopen.com/books/robotics-legal-ethical-and-socioeconomic-impacts/robots-liability-a-use-case-and-a-potential-solution

a robot liability matrix as a mechanism to distribute liabilities between the robot, the manufacturer, and the owner, depending on the knowledge programmed by the manufacturer and the one acquired by the robot (through its learning ability and the adjustments made by the owner), that would distribute the responsibility for damages among the three agents involved. Pagallo[93] examines the impact of robotics technology on legal systems and how a new generation of robo-traders, AI chauffeurs, artificial pop singers and autonomous lethal weapons affect individual's knowledge, environments and perceptions of the world and suggests that at least in the civil law-field, "only robots shall pay" at times may be the right answer.

Privacy invasions

Robots may help exacerbate privacy invasions (as Calo explains, "Robots can go places humans cannot go, see things humans cannot see[94]), e.g., via use of face-recognition software to identify and profile individuals or locate individuals.[95] Calo suggests robots "greatly facilitate *direct surveillance*" due to their sophisticated sensors and processors which "greatly magnify the human capacity to observe". Calo also highlights how robots implicate privacy by introducing "new points of *access* to historically protected spaces" citing the example of the home robot.[96] Calo cautions about a third way in which robots implicate privacy, i.e., stemming from their "unique *social meaning"* and social dimension which Calo suggests presents the following dangers:[97] First, the introduction of social robots into living and other spaces historically reserved for solitude, may reduce the dwindling opportunities for interiority and self-reflection that privacy operates to protect; second, social robots may be in a unique position to extract information from people and can leverage most of the same advantages of humans (fear, praise, etc.) in information gathering, but they also have perfect memories, are tireless, and cannot be embarrassed, giving robots advantages over human persuaders; finally, the social nature of robots may lead to new types of highly sensitive personal information—implicating what might be called "setting privacy."[98]

Replacement of human workers and job losses

One of the key concerns[99] related to the use of robots relates to the replacement of human workers and consequent job losses (noting that this will not happen in all cases[100], contexts or automatically; it might also have a liberative and positive effect) – especially, in relation to lower skilled jobs in labour-

[93] Pagallo, U., "What Robots Want: Autonomous Machines, Codes and New Frontiers of Legal Responsibility", In M. Hildebrandt, J. Gaakeer (eds.), *Human Law and Computer Law: Comparative Perspectives*., Ius Gentium: Comparative Perspectives on Law and Justice, Vol 25. Springer, Dordrecht. https://link.springer.com/chapter/10.1007/978-94-007-6314-%202_3#citeas

[94] Calo, M. Ryan, "Robots and privacy", in Patrick Lin, Keith Abney and George A. Bekey (eds.), *Robot Ethics: The Ethical and Social Implications of Robotics*, 2012, pp 187-202.

[95] Woo, Marcus, "Robots: can we trust them with our privacy", *BBC Future*, 5 June 204. http://www.bbc.com/future/story/20140605-the-greatest-threat-of-robots

[96] Calo, op. cit., 2012.

[97] Summarised here.

[98] Calo, op. cit., 2012.

[99] See https://www.theguardian.com/technology/2017/mar/24/millions-uk-workers-risk-replaced-robots-study-warns; https://www.theatlantic.com/business/archive/2015/09/jobs-automation-technological-unemployment-history/403576/ ; http://www.newsweek.com/bullshit-jobs-age-automation-why-are-americans-still-working-so-hard-983753

[100] See Jackson, Gavin, "Job loss fears from automation overblown, says OECD", *Financial Times,* 1 April 2018. https://www.ft.com/content/732c3b78-329f-11e8-b5bf-23cb17fd1498

intensive sectors which, as the EU Parliament Resolution[101] on Civil Law Rules on Robotics underlines, are likely to be more vulnerable to automation – how would/does the law protect sections of the population that might be vulnerable to losing this jobs? Is there/will there be legislative and policy action to invest in education and reforms to improve reallocation, development of new skills or lifelong learning for humans that are replaced by robots or have to work alongside them? If this is not done, then human workers might not be equipped or fall short in terms of their self-fulfilment potential and their contribution to the economy and society.[102]

Consumer protection issues

Hartzog, using the examples of robots such as household helpers, personal digital assistants, automated cars, and personal drones, suggest they "raise common consumer protection issues, such as fraud, privacy, data security, and risks to health, physical safety and finances".[103] Some of these have already been covered above. Hartzog also suggests robots "raise new consumer protection issues, or at least call into question how existing consumer protection regimes might be applied to such emerging technologies".[104]

Intellectual property issues

Intellectual property issues related to robots include, e.g., whether a robot be an author or an inventor? Or whether a robot can co-author a work with human intelligence? While there is no consensus[105] on how intellectual property rights might be devolved to robots, some suggest that given the direction of some policy-makers to consider legal status for robots might lead to intellectual property rights stemming from this.[106] As the capacity of robots to create and innovate increases, these will become challenges that will need definitive answers and/or come to be adjudicated as conflicts arise between humans and robots, or robots versus robots.

Conclusion

As one can see, there are a variety of legal issues pertaining to AI and robotics; some common problems of ICT technology in general - though facilitated or exacerbated by AI and robotics in some way and other issues are novel and developing e.g., legal personhood for AI systems and robots.

Many of the identified issues have wide-ranging societal and human rights implications. Such issues will affect a spectrum of human rights principles: data protection, equality, freedoms, human autonomy and self-determination of the individual, human dignity, human safety, informed consent,

[101] European Parliament, Resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics. http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P8-TA-2017-0051+0+DOC+XML+V0//EN

[102] World Economic Forum (In collaboration with The Boston Consulting Group), *Towards a Reskilling Revolution: A Future of Jobs for All*, January 2018. http://www3.weforum.org/docs/WEF_FOW_Reskilling_Revolution.pdf

[103] Hartzog, Woodrow, "Unfair and Deceptive Robots", 74 *Maryland Law Review* 785, May 2015. http://digitalcommons.law.umaryland.edu/cgi/viewcontent.cgi?article=3675&context=mlr

[104] Hartzog, op. cit., 2015.

[105] Li, Tiffany and Charles Roslof, "Robots vs. Monkeys: Intellectual Property Rights of Non-Human Creators [Poster Session] SSRN, 29 March 2016. https://ssrn.com/abstract=2756245

[106] Kathrani, Paresh, "Could intelligent machines of the future own the rights to their own creations?" The Conversation, 1 Dec 2017. https://theconversation.com/could-intelligent-machines-of-the-future-own-the-rights-to-their-own-creations-86005

integrity, justice and equity, non-discrimination, privacy and self-determination.[107] As AI and robotics technologies work closely together and with vast amounts of data, they will have cross-over and multiplicative effects that exacerbate legal and human rights issues related to them. Such issues might also amplify if the AI and robotics industry develops applications and systems without paying attention early-on in the design and development process to the impacts of such technologies on human rights and societal values.

Using a mix of the following criteria: (a) their prominence in legal and policy discussions at the international regional or national level, (b) their prevalence in policy and legal academic discussions especially at the global and regional (i.e., EU-policy) level and (c) their potential to impact ethical values and human rights, (d) novelty and need for further research (given emerging scientific interest and rapid technological developments) to gain insights, inform and enhance current debates, we shortlisted the following topics of study for AI from the above at the national level:

- Algorithmic bias and discrimination (including automated decision-making systems), i.e., how does the law deal with issues of algorithmic bias and discrimination?
- Intellectual property issues related to works created by AI

For robotics, we have shortlisted the following for study at the national level:

- Creation of a specific legal status for robots, i.e., legal personhood or electronic personality, i.e., has the law created/does the law recognise a specific legal status for robots? Are there any movements in this direction?
- Safety and civil liability issues: who is liable for damage caused by robots?

We next analyse and assess relevant international and regional laws and human rights standards.

4. Analysis of relevant international and regional laws and human rights standards

This section presents an overview, mapping and analysis of relevant international and regional laws and human rights standards that may be applicable to AI and robotics. We look at relevant organisations, their competencies, sources of law (e.g., hard, soft law and case law), map legal issues to international treaties and assess current position and gaps to help consolidate knowledge and refine clarity for further work in the area.

4.1 **Relevant organisations and sources of law**

Relevant organisations under the purview of this research include the United Nations (including the World Intellectual Property Organization or WIPO), the International Court of Justice (ICJ), Council of Europe, the African Union (AU) and the African Court of Justice and the Organization of American States (OAS). The scope of the mandates of each of these organisations differs.

[107] The results of the socio-economic impact assessment carried out in SIENNA that also highlighted such issues: Jansen, P., et al, SIENNA *D4.1: State-of-the-art Review: AI and robotics*, April 2018.

The UN's scope, per its Charter[108], includes maintaining international peace and security[109], developing friendly relations among nations based on respect for the principle of equal rights and self-determination of peoples, and taking other appropriate measures to strengthen universal peace; achieving international co-operation in solving international problems of an economic, social, cultural, or humanitarian character, and in promoting and encouraging respect for human rights and for fundamental freedoms for all without distinction as to race, sex, language, or religion; and being a centre for harmonising the actions of nations in the attainment of these common ends. The UN is not authorised to intervene in "matters which are essentially within the domestic jurisdiction of any state or shall require the Members to submit such matters to settlement under the present Charter…".[110] We note, the establishment of the UNICRI Centre for Artificial Intelligence and Robotics in The Hague, the Netherlands, tasked with activities such as performing risk assessment and stakeholder mapping and analysis; implementation of training and mentoring programmes; contributing to the UN Sustainable Development Goals through facilitation of technology exchange and by orienting policies to promote security and development; convening expert meetings; organising policy makers' awareness-raising workshops and international conferences.[111] UN High Commissioners, Special Rapporteurs, and independent experts have produced reports on lethal autonomous robotics (LARs)[112], the impact of assistive and robotics technology, artificial intelligence and automation on the human rights of older persons[113], and on ways to bridge the gender digital divide from a human rights perspective[114].

The ICJ settles, in accordance with international law, legal disputes submitted to it by States (contentious cases) and gives advisory opinions (advisory procedures) on legal questions referred to it by duly authorised United Nations organs and specialised agencies.[115]

The Council of Europe (CoE) based in Strasbourg, is an international organisation comprising 47 countries of Europe and established to promote democracy and protect human rights and the rule of law in Europe.[116] The Council of Europe is very proactive in relation to AI and has set up a taskforce to

[108] http://www.un.org/en/charter-united-nations/
[109] Via collective measures for the prevention and removal of threats to the peace, for the suppression of acts of aggression or other breaches of the peace, and to bring about by peaceful means, and in conformity with the principles of justice and international law, adjustment or settlement of international disputes or situations which might lead to a breach of the peace.
[110] UN Charter, Article 2(7).
[111]UNICRI Centre for Artificial Intelligence and Robotics.
http://www.unicri.it/in_focus/on/UNICRI_Centre_Artificial_Robotics
[112] UN General Assembly, Human Rights Council, "Report of the Special Rapporteur on extrajudicial, summary or arbitrary executions, Christof Heyns", Twenty-third session, Agenda item 3, Promotion and protection of all human rights, civil, political, economic, social and cultural rights, including the right to development, 9 April 2013, A/HRC/23/47. https://www.ohchr.org/Documents/HRBodies/HRCouncil/RegularSession/Session23/A-HRC-23-47_en.pdf
[113] UN General Assembly, Human Rights Council, "Report of the Independent Expert on the enjoyment of all human rights by older persons," Thirty-sixth session, Promotion and protection of all human rights, civil, political, economic, social and cultural rights, including the right to development**,** 21 July 2017, A/HRC/36/48.
[114] UN General Assembly, Human Rights Council, "Promotion, protection and enjoyment of human rights on the Internet: ways to bridge the gender digital divide from a human rights perspective", Report of the United Nations High Commissioner for Human Rights, Thirty-fifth session, 5 May 2017. A/HRC/35/9.
https://documents-dds-ny.un.org/doc/UNDOC/GEN/G17/111/81/PDF/G1711181.pdf?OpenElement
[115] http://www.icj-cij.org/en/cases
[116] https://www.coe.int/en/web/about-us/do-not-get-confused

assess both the threats and opportunities of AI for human rights.[117] The CoE Committee of Ministers adopted Declaration Decl(13/02/2019)1 on the manipulative capabilities of algorithmic processes.[118] The CoE Parliamentary Assembly published Recommendation n°2102(2017) about Technological convergence, artificial intelligence and human rights.[119] There have also been other actions, e.g., a group of parliamentarians proposed a motion for a recommendation on *Justice by algorithm (the role of artificial intelligence in policing and criminal justice systems)*[120]; creation of a new Sub-Committee on artificial intelligence and human rights in 2019 by the Committee on Legal Affairs and Human Rights; publication of a comment in July 2018 by the Commissioner for Human Rights on the human rights issues at stake in AI development and use.[121]

The African Union (AU) (successor of the Organization of African Unity or OAU) is an inter-governmental organisation of African nations. Its vision is "An integrated, prosperous and peaceful Africa driven by its own citizens and representing a dynamic force in the global arena."[122] Its objectives include promoting and protecting human and peoples' rights in accordance with the African Charter on Human and Peoples' Rights and other relevant human rights instruments. It has various organs including the Pan-African Parliament. The African Court on Human and Peoples' Rights (which complements and reinforces the functions of the African Commission on Human and Peoples' Rights), has jurisdiction over all cases and disputes submitted to it concerning the interpretation and application of the African Charter on Human and Peoples' Rights, the Protocol and any other relevant human rights instrument ratified by the States concerned.[123] Specifically, the Court has two types of jurisdiction: contentious and advisory. The AU partnered in the UNESCO Forum on AI in Africa - the forum discussed the issues and challenges related to the development and use of AI in Africa).[124] At the 32nd AU summit held in Feb 2019, the Rwandan President and outgoing AU Chairperson Kagame encouraged leaders to work alongside regional organisations and the private sector to prepare youth for the "technologies that are reshaping global commerce," such as artificial intelligence, robotics, data mining, and cybersecurity.[125]

[117] Council of Europe, "Council of Europe and Artificial Intelligence". https://www.coe.int/en/web/artificial-intelligence

[118] Council of Europe, *Declaration by the Committee of Ministers on the manipulative capabilities of algorithmic processes*, Adopted by the Committee of Ministers on 13 February 2019 at the 1337th meeting of the Ministers' Deputies. https://search.coe.int/cm/pages/result_details.aspx?objectid=090000168092dd4b

[119] Council of Europe, *Recommendation 2102 (2017)1 Technological convergence, artificial intelligence and human rights*, 2017.

[120] Council of Europe signatories, *Justice by algorithm – the role of artificial intelligence in policing and criminal justice systems*, Motion for a recommendation, Doc. 14628, 26 September 2018.

[121] https://www.coe.int/en/web/commissioner/-/safeguarding-human-rights-in-the-era-of-artificial-intelligence

[122] African Union, "AU in a nutshell". https://au.int/en/history/oau-and-au

[123] http://www.african-court.org/en/

[124] The Forum report outlines: AI is experiencing uneven development in Africa because the institutional, economic and social conditions of African countries do not always create an enabling environment to unleash its potential. Indeed, for the moment, the real advancement and development in this area is generally taking place in Kenya, Nigeria, Rwanda and South Africa - the countries that are the Continent's main technological champions. UNESCO Forum on artificial intelligence in Africa, Mohammed VI Polytechnic University, Benguérir, Morocco 12th-13th of December 2018.
https://fr.unesco.org/sites/default/files/ai_working_file_3_12_18_eng.pdf

[125] Roby, Christin, "AU summit opens with focus on peace and migration", *Devex.com*,11 February 2019.
https://www.devex.com/news/au-summit-opens-with-focus-on-peace-and-migration-94291

The Organization of American States (OAS) brings together all 35 independent states of the Americas[126] and constitutes the main political, juridical, and social governmental forum in the hemisphere. It has granted permanent observer status to 69 states, and to the European Union (EU)[127]. As per its Charter[128], the OAS "has no powers other than those expressly conferred upon it by this Charter, none of whose provisions authorizes it to intervene in matters that are within the internal jurisdiction of the Member States" (Article 1). It has the following essential purposes (Article 2, Charter), i.e., strengthen peace and security of the continent; promote and consolidate representative democracy, with due respect for the principle of non-intervention; prevent possible causes of difficulties and to ensure the pacific settlement of disputes that may arise among the Member States; provide for common action on the part of those States in the event of aggression; seek the solution of political, juridical, and economic problems that may arise among them; promote, by cooperative action, their economic, social, and cultural development; eradicate extreme poverty, which constitutes an obstacle to the full democratic development of the peoples of the hemisphere; and achieve an effective limitation of conventional weapons that will make it possible to devote the largest amount of resources to the economic and social development of the Member States. The OAS has had reflections with its Ministers and High Authorities on the power of transformative technologies, such as robotics; artificial intelligence; 3D printing; advanced manufacturing; Internet of things etc.[129]

International sources of law include international treaties, custom, and general principles of law. Judicial decisions and teachings may be applied as "subsidiary means for the determination of rules".[130]

International treaties that are broadly relevant to AI and robotics include the UN Charter, human rights treaties[131], intellectual property treaties[132], Convention on Conventional Weapons (CCW)[133], the European Convention on Human Rights (ECHR), Council of Europe Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data Convention 108)[134] (as modernised)[135], and the Council of Europe Convention on Cybercrime (Convention 185)[136]. Other relevant Council of Europe documents include its *Guidelines on the protection of individuals with regard to the processing of personal data in a world of Big Data* (2017)[137] and its *Practical guide on the use of personal data in the police sector* (2018)[138].

The European Commission for the Efficiency of Justice (CEPEJ) of the Council of Europe adopted the European Ethical Charter on the Use of Artificial Intelligence in Judicial Systems and their

[126] http://www.oas.org/en/member_states/default.asp
[127] http://www.oas.org/en/ser/dia/perm_observers/countries.asp
[128] http://www.oas.org/en/sla/dil/inter_american_treaties_A-41_charter_OAS.asp
[129] See http://www.oas.org/en/sedi/desd/stm/2017/about.asp
[130] Article 38 of the Statute of the International Court of Justice.
[131] See United Nations, "The Core International Human Rights Instruments and their monitoring bodies". https://www.ohchr.org/EN/ProfessionalInterest/Pages/CoreInstruments.aspx
[132] http://www.wipo.int/treaties/en/
[133] Convention on prohibitions or restrictions on the use of certain conventional weapons which may be deemed to be excessively injurious or to have indiscriminate effects, as amended on 21 December 2001.
[134] ETS No. 108. The Convention is the only binding international legal instrument in the field, with a potential worldwide scope of application. https://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/108
[135] https://search.coe.int/cm/Pages/result_details.aspx?ObjectId=09000016807c65bf
[136] ETS No.185. https://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/185
[137] https://rm.coe.int/t-pd-2017-1-bigdataguidelines-en/16806f06d0
[138] https://rm.coe.int/t-pd-201-01-practical-guide-on-the-use-of-personal-data-in-the-police-/16807927d5

environment[139] during its 31st Plenary meeting in Strasbourg, 3-4 December 2018. The Charter sets out five principles for the ethical use of AI in judicial systems and their environment – respect for fundamental rights, non-discrimination, quality and security, transparency, and user control.

Relevant AU treaties include: the African Charter on Human and Peoples' Rights (Banjul Charter)[140], Protocol to the African Charter on Human and Peoples' Rights on the Rights of Older Persons[141], Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa[142], African Union Road Safety Charter[143], and African Charter on the Rights and Welfare of the Child (ACRWC)[144].

Relevant treaties in the Inter-American system include the American Declaration of the Rights and Duties of Man (Bogota Declaration), American Convention on Human Rights/Pact of San Jose (ACHR); Inter-American Convention against Racism, Racial Discrimination and Related Forms of Intolerance (IACRRDRFI); Inter-American Convention against All Forms of Discrimination and Intolerance; (IACAFDI) Additional Protocol to the American Convention on Human Rights in the area of Economic, Social and Cultural rights (Protocol of San Salvador); Inter-American Convention on the Elimination of all Forms of Discrimination Against Persons with Disabilities (IACEFDPD); Inter-American Convention on Protecting the Human Rights of Older Persons (IACPHROP).

We also note here the promulgation of the *Declaration on Ethics and Data Protection in Artificial Intelligence* at the 40th International Conference of Data Protection and Privacy Commissioners on the 23rd October 2018, Brussels.[145] The Declaration inter alia affirms that the "respect of the rights to privacy and data protection are increasingly challenged by the development of artificial intelligence and that this development should be complemented by ethical and human rights considerations".[146] It presents guiding principles: fairness, continued vigilance and attention, systems transparency and intelligibility, responsible design and development by applying the principles of privacy by default and privacy by design, empowerment of every individual**,** reduction and mitigation of unlawful biases or discrimination. The 40th International Conference of Data Protection and Privacy Commissioners also called for:

> **common governance principles on artificial intelligence** to be established, fostering concerted international efforts in this field, in order to ensure that its development and use take place in accordance with ethics and human values, and respect human dignity. These common governance principles must be able to tackle the challenges raised by the rapid evolutions of artificial intelligence technologies, on the basis of a multi-stakeholder approach in order to address all cross-sectoral issues at stake. They must take place at an international level since the development of artificial intelligence is a trans- border phenomenon and may affect all humanity. The Conference should be involved in this international effort, working with and supporting general and sectoral authorities in other fields such as competition, market and consumer regulation.

[139] https://rm.coe.int/ethical-charter-en-for-publication-4-december-2018/16808f699c
[140] http://www.achpr.org/instruments/achpr/
[141] https://au.int/en/treaties/protocol-african-charter-human-and-peoples'-rights-rights-older-persons
[142] http://www.achpr.org/instruments/women-protocol/
[143] https://au.int/en/treaties/road-safety-charter
[144] http://www.achpr.org/instruments/child/
[145] https://icdppc.org/wp-content/uploads/2018/10/20180922_ICDPPC-40th_AI-Declaration_ADOPTED.pdf
[146] https://icdppc.org/wp-content/uploads/2018/10/20180922_ICDPPC-40th_AI-Declaration_ADOPTED.pdf

4.2 **Mapping, analysis and assessment of the existing legislation**

International human rights treaties lay down obligations which their signatories are bound to respect and fulfil; States must refrain from interfering with rights and take positive actions to fulfil their enjoyment. While, none of them might explicitly apply or mention 'artificial intelligence' or 'robotics', their broad and general scope would cover the issues identified.

The table below maps the legal issues identified in section 3 for AI to the international treaties[147] to further understand whether such provisions exist and are adequate and to understand the gaps and challenges. Note, the table only provides few examples (global to regional) and is not an exhaustive listing.

Legal issue – AI	Treaty that may apply (with examples)
Algorithmic transparency/transparency in automated decision-making	• Modernised Convention 108 (to obtain, on request, knowledge of the reasoning underlying data processing where the results of such processing are applied to him or her; fair and transparent processing of data)
Unfairness, bias and discrimination	• CEDAW (elimination of all forms of discrimination against women; equal rights of men and women) • CRC (enjoyment of children's rights without discrimination) • ICERD (discrimination); • ICCPR (equality before the law, equal protection of the law without discrimination) • ICESCR (enjoyment of prescribed rights without discrimination) • ICMW (non-discrimination, right to life of migrant workers; right to liberty and security of the person) • CRPD (equality; prohibition of discrimination on the basis of disability) • European Convention on Human Rights (right to fair trial, prohibition of discrimination) • Banjul Charter (Right to freedom from discrimination) • IACRRDRFI (protection against racism, racial discrimination, and related forms of intolerance in any sphere of life, public or private) • IACAFDI (protection against any form of discrimination and intolerance in any sphere of life, public or private) • IACEFDPD (prevention and elimination of all forms of discrimination against persons with disabilities and the promotion of their full integration into society) • IACPHROP (quality and non-discrimination for reasons of age)
Intellectual property issues	• WCT (protection of the rights of authors in their literary and artistic works; computer programs protected as literary works) • WPPT (rights of performers and producers of phonograms; moral and economic rights of performers) • TRIPS Agreement (patents available for inventions in all fields of technology, if new, involve an inventive step, are capable of industrial application and not otherwise excluded)
Legal personhood issues – should/can AI systems can be deemed subjects of law?	Not covered.

[147] We looked at the key treaties including the core international human rights instruments.

Legal issue – AI	Treaty that may apply (with examples)
Issues related to AI vulnerabilities in cybersecurity	• Convention 108 (data security) • Convention 185 (measures relating to Offences against the confidentiality, integrity and availability of computer data and systems)
Issues related to impact of AI on the workplace and workers	• ICERD (prohibition in relation to discrimination in relation to the enjoyment of rights to work, to free choice of employment, to just and favourable conditions of work, to protection against unemployment, to equal pay for equal work, to just and favourable remuneration) • ICESCR (right to work, including the right of everyone to the opportunity to gain his living by work which he freely chooses or accepts) • CRPD (right of persons with disabilities to work, on an equal basis with others) • Banjul Charter (right to work under equitable and satisfactory conditions) • Protocol of San Salvador (right to work, including the opportunity to secure the means for living a dignified and decent existence by performing a freely elected or accepted lawful activity; just, equitable, and satisfactory conditions of work)
Privacy and data protection issues	• UDHR (No arbitrary interference with privacy, family, home or correspondence) • ICCPR (no arbitrary or unlawful interference with his privacy, family, home or correspondence, nor to unlawful attacks on his honour and reputation); • ICMW (migrant's right to privacy) • CRPD (respect for privacy of person with disabilities) • European Convention on Human Rights (right to respect for private and family life) • Convention 108 (right to privacy and data protection; fair and lawful collection and processing of personal data) • CRC, ACRWC (children's privacy) • IACPHROP (Protection of the integrity of older persons and their privacy and intimacy in all their activities, particularly in acts of personal hygiene; right to privacy and intimacy)
Liability issues related to damage caused by AI	• Convention 185 (corporate liability for criminal offences)
Accountability for harms	Not covered.

Table 3: AI legal issues and international treaties

As evident, international human rights instruments broadly provide very general coverage of some of the legal issues of AI outlined above. None of the instruments specifically address such issues (with good reason and given that most of these instruments are technologically neutral and human-centric).

One international human rights lawyer suggests "there is much more that United Nations human rights bodies could do to address the human rights challenges posed by AI and related new technologies" given the presence of supportive institutions (e.g., High Commissioner for Human Rights, human rights

treaty bodies, Special Rapporteurs);[148] he also underlines that "very little sustained and substantive attention has been paid to these issues by UN human rights bodies to date. In the absence of more attention at the UN level, the charge that the human rights regime is not providing much clarity and guidance to the AI debate is a valid one".[149]

This table below maps legal issues of robotics identified in section 3 to international treaties[150] (global to regional) to further understand whether such provisions exist and are adequate and to understand the gaps and challenges.

Legal issue – Robotics	Treaty that may apply (with examples)
Deception by robots	• Convention 185 (covers computer-related forgery and fraud)
Legal personhood for robots	Not covered.
Use of autonomous weapons to cause harm and make threats of harm	• UDHR (right to life, liberty and security of person) • ICERD (prohibition in relation to discrimination in relation to the right to security of person and protection by the State against violence or bodily harm, whether inflicted by government officials or by any individual group or institution) • CCW (prohibitions or restrictions on the use of certain conventional weapons which may be deemed to be excessively injurious or to have indiscriminate effects) • European Convention on Human Rights (right to life) • ACHR (right to liberty and security) • Bogota Declaration
Safety and control issues of robots particularly those affecting the right to life and/or bodily integrity	• UDHR (right to life, liberty and security of person) • ICCPR (inherent right to life) • CAT (prevention of torture and other Cruel, Inhuman or Degrading Treatment or Punishment) • CRC (development of appropriate guidelines for the protection of the child from information and material injurious to his or her well-being) • CRPD (right of persons with disabilities to enjoy the highest attainable standard of health without discrimination on the basis of disability) • European Convention on Human Rights (right to life) • Banjul Charter (respect for life and the integrity of person) • ACHR (right to life and right to have physical, mental and moral integrity respected – humane treatment, liberty and security) • Protocol of San Salvador (rights to health, healthy environment, special protection in old age, special protections for handicapped) • IACPHROP (right to life and dignity in old age, right to safety etc)
Ascribing liability for malicious or non-malicious use of robots	• Convention 185 (measures relating to offences against the confidentiality, integrity and availability of computer data and systems; corporate liability for criminal offences)

[148] van Veen, Christiaan, "Artificial Intelligence: What's Human Rights Got To Do With It?" *Points,* 14 May 2018. https://points.datasociety.net/artificial-intelligence-whats-human-rights-got-to-do-with-it-4622ec1566d5
[149] van Veen, op. cit., 2018.
[150] We looked at the key treaties including the core international human rights instruments; this is not an exhaustive analysis.

Legal issue – Robotics	Treaty that may apply (with examples)
Privacy invasions by robots	• CRC (children's privacy) • ICCPR (no arbitrary or unlawful interference with his privacy, family, home or correspondence, nor to unlawful attacks on his honour and reputation) • CRPD (respect for privacy of person with disabilities) • European Convention on Human Rights (right to respect for private and family life) • Convention 108 (right to privacy and data protection; fair and lawful collection and processing of personal data) • IACPHROP (Older persons right to give free and informed consent on health matters; right freely to consent to, refuse, or suspend medical or surgical treatment[151]; protection of the integrity of older persons and their privacy and intimacy in all their activities, particularly in acts of personal hygiene.
Replacement of human workers and job losses	• UDHR (right to work, to free choice of employment, to just and favourable conditions of work and to protection against unemployment) • ICERD (prohibition in relation to discrimination in relation to the enjoyment of rights to work, to free choice of employment, to just and favourable conditions of work, to protection against unemployment, to equal pay for equal work, to just and favourable remuneration); • ICESCR (no deprivation of means of subsistence; right to work, including the right of everyone to the opportunity to gain his living by work which he freely chooses or accepts) • CRPD (right of persons with disabilities to work, on an equal basis with others) • Banjul Charter (right to work under equitable and satisfactory conditions) • Protocol of San Salvador (right to work, including the opportunity to secure the means for living a dignified and decent existence by performing a freely elected or accepted lawful activity; just, equitable, and satisfactory conditions of work)
Consumer protection issues related to use of robotic applications	• Convention 185 (computer-related forgery and fraud)
Intellectual property issues	• WCT (protection of the rights of authors in their literary and artistic works; computer programs protected as literary works) • WPPT (rights of performers and producers of phonograms; moral and economic rights of performers) • TRIPS Agreement (patents available for inventions in all fields of technology, if new, involve an inventive step, are capable of industrial application and not otherwise excluded) • Convention 185 (Offences related to copyright and related rights infringements)

Table 4: Robotics legal issues and international treaties

One of the key unaddressed issues at the international level remains legal personhood for robots. However, the lack of attention is very plausible given that personhood and legal status are defined and addressed at the national level.

[151] Including that of the traditional, alternative, and complementary kind—research, or medical or scientific experiments, whether physical or psychological, and to be given clear and timely information about the potential consequences and risks of such a decision.

4.3 Conclusions

While some AI and/or robotics issues seem well-covered in a general sense by the provisions in international law (though the law itself is not technology, i.e., 'AI' or 'robotics' specific), other issues such as legal personhood for robots and consumer protection issues are not addressed in existing treaties. Some issues by their nature are more naturally regulated at the regional or national level.

While the efforts of international organisations seem promising, in terms of actions at the policy levels, there is still much to be done to advance the discussion and actions on the legal regulation of AI and robotics. One might see the need for international organisations discussed in this report to come together to further deliberate on and:

- **pay particular attention to the global impacts of AI and robotics** and especially the more vulnerable international communities that need protection and would be left behind ('AI' divides),
- **determine the** challenges that need prioritising
- set **clear ground rules on what AI and robotics applications are not permitted** under international human rights law,
- determine how international actors (state and multi-national corporations leading the AI and robotics revolutions) could practically implement their human rights obligations through **positive and negative incentives**,
- **determine how to address the negative impacts caused by the import and export of AI**/and or robotics technology.

5. Analysis of relevant EU laws and human rights standards

This section presents an analysis of relevant EU laws and human rights standards. It first discusses relevant organisations and relevant EU laws, maps existing laws to identified legal issues and then examines how the law addresses the four specific issues (for AI – algorithmic bias and discrimination and intellectual property issues related to works created by AI; for robotics - creation of a specific legal status for robots and safety and civil liability issues).

5.1 Relevant organisations and EU law

The EU law-making and regulatory institutions have addressed AI and robotics in a number of documents, either by specifically referring to them or by means of instruments of a more general scope that also cover these issues. More detailed information on EU current and planned legislation is presented in the examination of selected issues in section 5.3, the following paragraphs are meant only to provide some more general overview of activities of the EU institutions.

The European Commission published, among others, the following Communications relating to AI or robotics: "Digitising European Industry" in April 2016,[152] "Building a European Data Economy" in

[152] European Commision, Digitising European Industry. Reaping the full benefits of a Digital Single Market, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM/2016/0180 final, Brussels, 19.4.2016.

January 2017,[153] "Artificial Intelligence for Europe"[154] in April 2018 (with an accompanying Commission Staff Working Document on Liability for emerging digital technologies[155]), "On the road to automated mobility" in May 2018[156] and the "Coordinated Plan on Artificial Intelligence"[157] in December 2018. In 2019, the Commission is planning to publish guidance on the interpretation of the Product Liability Directive in light of technological developments and a report on the broader implications for, potential gaps in and orientations for, the liability and safety frameworks for AI, the Internet of Things and robotics[158], as well as AI ethics guidelines, prepared by the European Commission's High-Level Expert Group on Artificial Intelligence (the draft guidelines were published for comment in December 2018).[159]

The European Parliament has adopted at number of resolutions referring to AI or robotics: on civil law rules on robotics in February 2017 (with recommendations to the Commission),[160] on fundamental rights implications of big data: privacy, data protection, non-discrimination, security and law-enforcement in March 2017,[161] on autonomous weapon systems in September 2018,[162] on the use of Facebook users' data by Cambridge Analytica and the impact on data protection in October 2018,[163] on autonomous driving in European transport in January 2019,[164] and on comprehensive European industrial policy on artificial intelligence and robotics, in February 2019.[165]

[153] European Commision, "Building A European Data Economy", Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM (2017) 9 final, Brussels, 10.1.2017

[154]European Commission, Artificial Intelligence for Europe, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM (2018) 237 final, Brussels, 25.4.2018. https://ec.europa.eu/digital-single-market/en/news/communication-artificial-intelligence-europe

[155] European Commission Staff, Working Document on liability for emerging digital technologies, COM (2018) 237 final, Brussels, 25.4.2018, (https://ec.europa.eu/digital-single-market/en/news/european-commission-staff-working-document-liability-emerging-digital-technologies

[156] European Commission, On the road to automated mobility: An EU strategy for mobility of the future, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM/2018/283 final Brussels, 17.5.2018

[157]European Commission, Coordinated Plan on Artificial Intelligence, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM (2018) 795 final, Brussels, 7.12.2018

[158] European Commission, Application of the Council Directive on the approximation of the laws, regulations, and administrative provisions of the Member States concerning liability for defective products (85/374/EEC), Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee, COM(2018) 246 final, Brussels, 7.5.2018.

[159] European Commission, "Draft Ethics guidelines for trustworthy AI", https://ec.europa.eu/digital-single-market/en/news/draft-ethics-guidelines-trustworthy-ai.

[160] European Parliament, Resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL));

[161] European Parliament, Resolution of 14 March 2017 on fundamental rights implications of big data: privacy, data protection, non-discrimination, security and law-enforcement (2016/2225(INI)).

[162] European Parliament, Resolution of 12 September 2018 on autonomous weapon systems (2018/2752(RSP)

[163] European Parliament, Resolution of 25 October 2018 on the use of Facebook users' data by Cambridge Analytica and the impact on data protection (2018/2855(RSP)

[164] European Parliament resolution of 15 January 2019 on autonomous driving in European transport (2018/2089(INI)).

[165] European Parliament, Resolution of 12 February 2019 on a comprehensive European industrial policy on artificial intelligence and robotics (2018/2088(INI)).

The Council of the European Union has addressed AI or robotics in some of its conclusions, including Council conclusions on the future of work: Making it e-easy from December 2017[166] or on Digital for Development (D4D) in November 2017.[167]

Additionally, the European Data Protection Supervisor (EDPS) has been one of the authors of the International Conference of Data Protection and Privacy Commissioners Declaration on Ethics and Data Protection in Artificial Intelligence (October 2018).[168]

The Court of Justice of the European Union (CJEU) so far has not ruled explicitly on AI or robotics, however the judgement in Google Spain[169] could be considered as relevant in the context of accountability for algorithms.[170]

Overall, the European Parliament seems to be more convinced that the existing legal framework is not sufficient to address AI and robotics challenges and consequently, is to a larger extent calling for a new legislation. The European Commission acknowledges these challenges but seems to be more cautious in its assessment of the need for new legislation; at this moment it has been focussing its activities more on evaluations and analysis.[171]

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[166] Council of the European Union, Council conclusions on the future of work: Making it e-easy, 14954/17, Brussels,
7 December 2017.

[167] Council of the European Union, Council conclusions on Digital for Development (D4D), 3578/ 17, Brussels, 20 November 2017.

[168] Commission Nationale de l'Informatique et des Libertés, European Data Protection Supervisor and Garante per la protezione dei dati personali, Declaration On Ethics and Data Protection in Artifical Intelligence, 40th International Conference of Data Protection and Privacy Commissioners, 23.10.2018, Brussels.

[169] Court of Justice of the European Union, *Google Spain SL and Google Inc. v Agencia Española de Protección de Datos (AEPD) and Mario Costeja González*, C-131/12, 14 May 2014.

[170] Nemitz, Paul, "Constitutional democracy and technology in the age of artificial intelligence", *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Science*s, vol. 376, no. 2133, October 2018. https://royalsocietypublishing.org/doi/10.1098/rsta.2018.0089, p. 6.

[171] For example, in the resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)), the European Parliament stated "whereas in the scenario where a robot can take autonomous decisions, the **traditional rules will not suffice** to give rise to legal liability for damage caused by a robot" (section AF) and that "**shortcomings of the current legal framework are also apparent i**n the area of contractual liability insofar as machines designed to choose their counterparts, negotiate contractual terms, conclude contracts and decide whether and how to implement them", what makes "**the traditional rules inapplicable**" (section AG). In the Resolution the Parliament also asked the Commission "to submit, on the basis of Article 114 TFEU, a **proposal for a legislative instrument on legal questions related to the development and use of robotics and artificial intelligence** foreseeable in the next 10 to 15 years, combined with non-legislative instruments such as guidelines and codes of conduct " (section 51) and requested "the Commission to submit, on the basis of Article 114 TFEU, a **proposal for a directive on civil law rules on robotics**" (section 65). Moreover, in its Resolution of January 2019 on autonomous driving in European transport, the Parliament underlined the need for a clear and harmonised legislation "**to clarify and enable the tackling, as soon as possible, of issues of liability**" (section 30.) In the resolution from February 2019 on a comprehensive European industrial policy on artificial intelligence and robotics, the Parliament welcomed the Commission's initiative to create the Expert Group on Liability and New Technologies, but **"regretted that no legislative proposal was put forward during this legislature**, thereby delaying the update of the liability rules at EU level and threatening the legal certainty across the EU in this area for both traders and consumers" (section 131-132). The Commission's approach is well-exemplified in its response to the Parliament's Resolution on Civil Law Rules on Robotics. Answering the above-quoted calls for legislative proposals, the Commission stated it "will **assess whether legislative action is necessary once the two parallel stakeholder consultation exercises will have been concluded**" (referring to

The EU has several existing (and forthcoming) laws relating to AI and robotics, predominantly in the form of human rights law e.g., EU Charter of Fundamental Rights, product liability and safety legislation, and data protection legislation.

In 2018, the European Commission set out the European approach to Artificial Intelligence.[172] The approach aims to, inter alia, ensure an appropriate ethical and legal framework for the development and use of AI. As far as legal issues are concerned, the Commission refers specifically to two questions: liability and potentially biased decision-making. The EC announced[173] that by mid-2019 it would issue a guidance document on the interpretation of Product Liability Directive in light of technological developments and a report on the broader implications for, potential gaps in and orientation for, the liability and safety frameworks for AI, Internet of Things (IoT) and robotics.

Products liability specifically for AI and robotics is currently being reviewed by the EC to create liability rules tailored to emerging digital technologies.[174] Such proposed changes will expand on existing products liability afforded by the Product Liability Directive[175], which creates liability for producers of defective products, regardless of negligence or fault, when such products cause damages (including personal injury or death and damage to property). Under this Directive, producers are defined broadly to include manufacturers, producers of raw materials and component parts, and importers. If a producer cannot be identified, each supplier of a product is considered its producer. Products are defined as "all movable objects, even when incorporated into another movable or… immovable object," and include electricity. Though the Directive applies to products used while providing services, it does *not* apply to the service provider himself. Thus, AI/robotics *products* are currently governed by this existing products liability, but any AI/robotics *services* are excluded.

In addition to products liability, existing EU safety legislation, which sets minimum health and safety requirements, also governs AI/robotics. Specifically, Directive (EC) 2006/42[176] on machinery provides

consultations "on product liability challenges in the context of the Internet of Things and autonomous systems and the evaluation of the Directive 85/374/EEC on Liability for Defective Products"). The Commission provided similar answers to more precise Parliament's proposals, for instance, when asked to present legal definitions for certain new technologies, it said that "**thorough examination of the existing robotics technologies and assessment of their potential development is necessary before being able to decide** whether the definition of cyber physical systems, autonomous systems, smart autonomous robots and of their subcategories is necessary for regulatory purposes." – European Commission, Follow up to the European Parliament resolution of 16 February 2017 on civil law rules on robotics 2015/2103 (INL), SP(2017)310 16/05/2017, p. 2-3. https://oeil.secure.europarl.europa.eu/oeil/spdoc.do?i=28110&j=0&l=en [emphasis added in all above quotes]

[172] European Commission, "Artificial intelligence: Commission outlines a European approach to boost investment and set ethical guidelines", Press release 25 April 2018. http://europa.eu/rapid/press-release_IP-18-3362_en.htm

[173] European Commission, Artificial Intelligence for Europe, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2018) 237 final, Brussels, 25.4.2018, https://ec.europa.eu/digital-single-market/en/news/communication-artificial-intelligence-europe

[174] European Commission Staff, Working Document on liability for emerging digital technologies, COM(2018) 237 final, Brussels, 25.4.2018, (https://ec.europa.eu/digital-single-market/en/news/european-commission-staff-working-document-liability-emerging-digital-technologies.

[175] Council, Directive 83/374/EEC of 25.07.1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products, OJ L 210, 7.8.1985.

[176] European Parliament and the Council, Directive 2006/42/EC of 17.05.2006 on machinery and amending Directive 95/16/EC (recast), OJ L 157, 9.6.2006.

health and safety requirements for robots, and the Radio Equipment Directive[177] applies to any product, including embedded software, that uses the radio frequency spectrum. Additionally, all products not specifically addressed by other safety legislation are governed by Directive 2001/95/EC[178], which requires that only safe products are placed on the market.

The General Data Protection Regulation (GDPR)[179] sets out the legal framework for protecting personal data. It addresses a number of issues raised by AI, such as automated decision-making, including profiling (article 22) or the "right to explanation" that concerns algorithmic transparency - according to GDPR data subject has a right to obtain meaningful information about the logic involved, as well as the significance and the envisaged consequences of automated decision-making, including profiling (articles 13-15; this concept, however, remains debated[180]). Other GDPR principles, such as purpose limitation, data minimization, storage limitation, as well as consent requirements, particularly in the case of sensitive data may significantly affect how AI should be developed and used in Europe.

In 2017, the EC proposed a Regulation on Privacy and Electronic Communications[181] that aims at updating the legal framework on ePrivacy in order to increase the protection of people's private life. It remains to be seen how it will impact AI.

5.2 Mapping, analysis and assessment of the existing legislation

The table below maps legal issues of AI to relevant EU legislation (hard law).

Legal issue – AI	Relevant EU legislation (examples)
Algorithmic transparency/transparency in automated decision-making	• Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) • Directive (EU) 2016/680 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard the processing of personal data by competent authorities for the purposes of the prevention, investigation, detection to or prosecution of criminal offences or the execution of criminal penalties, and on the free movement of such data, and repealing Council Framework Decision 2008/977/JHA (Police Directive)

[177] European Parliament and the Council, Directive 2014/53/EU of 16.04. 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment.
[178] European Parliament and the Council, Directive 2001/95/EC of 3.12. 2001 on general product safety.
[179] European Parliament and the Council, Regulation (EU) 2016/679 of 27.04.2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)
[180] Goodman, Bryce, and Seth Flaxman, "EU regulations on algorithmic decision-making and a "right to explanation", *AI Magazine*, Vol. 38, No.3, October 2017, pp. 50-57 [55-56]. https://www.aaai.org/ojs/index.php/aimagazine/article/view/2741/2647; Wachter, Sandra, Brent Mittelstadt and Luciano Floridi, "Why a Right to Explanation of Automated Decision-Making Does Not Exist in the General Data Protection Regulation", *International Data Privacy Law*, Volume 7, Issue 2, 1 May 2017, pp. 76–99. https://academic.oup.com/idpl/article/7/2/76/3860948
[181] https://ec.europa.eu/digital-single-market/en/news/proposal-regulation-privacy-and-electronic-communications

Legal issue – AI	Relevant EU legislation (examples)
Unfairness, bias and discrimination	• TEU articles 2, 3(3), 9 • TFEU article 10 • EU Charter of Fundamental Rights, articles 20-26 • Council Directive 2000/78/EC of 27 November 2000 establishing a general framework for equal treatment in employment and occupation (Employment Equality Directive) • Council Directive 2000/43/EC of 29 June 2000 implementing the principle of equal treatment between persons irrespective of racial or ethnic origin (Racial Equality Directive) • Council Directive 2004/113/EC of 13 December 2004 implementing the principle of equal treatment between men and women in the access to and supply of goods and services (Gender Goods and Services Directive) • Directive 2006/54/EC of the European Parliament and of the Council of 5 July 2006 on the implementation of the principle of equal opportunities and equal treatment of men and women in matters of employment and occupation (recast) • Council Directive 79/7/EEC of 19 December 1978 on the progressive implementation of the principle of equal treatment for men and women in matters of social security • Directive 2010/41/EU of the European Parliament and of the Council of 7 July 2010 on the application of the principle of equal treatment between men and women engaged in an activity in a self-employed capacity and repealing Council Directive 86/613/EEC • Council Directive 2010/18/EU of 8 March 2010 implementing the revised Framework Agreement on parental leave concluded by BUSINESSEUROPE, UEAPME, CEEP and ETUC and repealing Directive 96/34/EC (Text with EEA relevance) • Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) • Directive (EU) 2016/680 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data by competent authorities for the purposes of the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, and on the free movement of such data, and repealing Council Framework Decision 2008/977/JHA (Police Directive) • Directive (EU) 2016/681 of the European Parliament and of the Council of 27 April 2016 on the use of passenger name record (PNR) data for the prevention, detection, investigation and prosecution of terrorist offences and serious crime
Intellectual property issues	• TFEU, Article 118 • EU Charter of Fundamental Rights article 17 (2) • Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society • Directive 2006/115/EC of the European Parliament and of the

Legal issue – AI	Relevant EU legislation (examples)
	Council of 12 December 2006 on rental right and lending right and on certain rights related to copyright in the field of intellectual property (codified version) • Directive 2001/84/EC of the European Parliament and of the Council of 27 September 2001 on the resale right for the benefit of the author of an original work of art • Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs (Codified version) (Text with EEA relevance) • Directive 2004/48/EC of the European Parliament and of the Council of 29 April 2004 on the enforcement of intellectual property rights • Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases • Directive 2012/28/EU of the European Parliament and of the Council of 25 October 2012 on certain permitted uses of orphan works Text with EEA relevance • Directive 98/71/EC of the European Parliament and of the Council of 13 October 1998 on the legal protection of designs • Regulation (EU) No 1257/2012 of the European Parliament and of the Council of 17 December 2012 implementing enhanced cooperation in the area of the creation of unitary patent protection • Regulation (EU) 2017/1001 of the European Parliament and of the Council of 14 June 2017 on the European Union trade mark • Directive (EU) 2016/943 of the European Parliament and of the Council of 8 June 2016 on the protection of undisclosed know-how and business information (trade secrets) against their unlawful acquisition, use and disclosure
Legal personhood issues – should/can AI systems can be deemed subjects of law?	Not covered.
Issues related to AI vulnerabilities in cybersecurity	• Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union • Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC • Directive 2013/40/EU of the European Parliament and of the Council of 12 August 2013 on attacks against information systems and replacing Council Framework Decision 2005/222/JHA • Regulation (EU) No 526/2013 of the European Parliament and of the Council of 21 May 2013 concerning the European Union Agency for Network and Information Security (ENISA) and repealing Regulation (EC) No 460/2004 • Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications)
Issues related to impact of AI	• TEU article 3(1), (3)

Legal issue – AI	Relevant EU legislation (examples)
and robotics on the workplace and workers	• TFEU article 9, 107(3)(a), articles 145-166, • EU Charter of Fundamental Rights, articles 14-15, 27-32 • Regulation (EU) No 1304/2013 of the European Parliament and of the Council of 17 December 2013 on the European Social Fund and repealing Council Regulation (EC) No 1081/2006
Privacy and data protection issues	• EU Charter of Fundamental Rights, articles 7-8 • Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) • Directive (EU) 2016/680 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data by competent authorities for the purposes of the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, and on the free movement of such data, and repealing Council Framework Decision 2008/977/JHA (Police Directive) • Directive (EU) 2016/681 of the European Parliament and of the Council of 27 April 2016 on the use of passenger name record (PNR) data for the prevention, detection, investigation and prosecution of terrorist offences and serious crime • Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications)
Liability issues related to damage caused by AI	• TFEU, Articles 4(2)(f), 12, 114 and 169 • EU Charter of Fundamental Rights articles 38, 47 • Council Directive 85/374/EEC of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products
Accountability for harms	• Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)

Table 5: AI legal issues and examples of relevant EU legislation

Currently, EU hard law as a rule does not provide solutions specifically tailored for challenges brought (and to be brought) by AI, but rather offers a framework that may cover the issues outlined above on broader terms. However, three remarks have to made on this general conclusion. First, this assessment applies to a lesser extent to the issues of algorithmic transparency and transparency in automated decision-making, unfairness, bias and discrimination and data protection. With the GDPR, Police Directive and Directive on the Use of Passenger Name Record's[182] explicit referencing to the

[182] European Parliament and Council, Directive (EU) 2016/681 of the of 27 April 2016 on the use of passenger name record (PNR) data for the prevention, detection, investigation and prosecution of terrorist offences and serious crime, OJ L 119, 4.5.2016.

automated processing of data and automated-decision making, these areas seem to be more specifically addressed. Second, the above table lists examples only from current EU legislation, while the European Commission has already presented some proposal for legislation that addresses AI more directly.[183] Third, some of the issues outlined above may not need to be tackled by means of a direct reference in a hard law. For instance, some aspects of the impact of AI on the workplace (connected to training, education or unemployment) may be better addressed by economic or educational policies (and some steps in this area have already been taken: e.g., one of the aims of the Commission's proposal for a Regulation of the European Parliament and of the Council establishing the Digital Europe programme for the period 2021-2027 is to "ensure that the current and future labour force can easily acquire advanced digital skills, notably in high performance computing, artificial intelligence and cybersecurity, by offering students, graduates, and existing workers the means to acquire and develop these skills, no matter where they are situated" [184] and this to be done by providing funding rather than further general legislative interventions).

Robotics

The table below maps legal issues of robotics to relevant EU legislation (hard law).

Legal issue – Robotics	Relevant EU legislation (examples)
Deception by robots	• Directive 2006/114/EC of the European Parliament and of the Council of 12 December 2006 concerning misleading and comparative advertising (codified version) • Directive 2005/29/EC of the European Parliament and of the Council of 11 May 2005 concerning unfair business-to-consumer commercial practices in the internal market and amending Council Directive 84/450/EEC, Directives 97/7/EC, 98/27/EC and 2002/65/EC of the European Parliament and of the Council and Regulation (EC) No 2006/2004 of the European Parliament and of the Council ('Unfair Commercial Practices Directive') • Directive 2002/65/EC of the European Parliament and of the Council of 23 September 2002 concerning the distance marketing of consumer financial services and amending Council Directive 90/619/EEC and Directives 97/7/EC and 98/27/EC
Legal personhood for robots	Not covered.
Use of autonomous weapons to cause harm and make threats of harm	• TEU article 21 • EU Charter of Fundamental Rights articles 2-4, article 6 • Regulation (EU) 2019/125 of the European Parliament and of the Council of 16 January 2019 concerning trade in certain goods which could be used for capital punishment, torture or other cruel, inhuman or degrading treatment or punishment • Directive 2009/43/EC of the European Parliament and of the Council of 6 May 2009 simplifying terms and conditions of transfers of defence-related products within the Community

[183] For example: European Commission, Proposal for a Regulation establishing the European Cybersecurity Industrial, Technology and Research Competence Centre and the Network of National Coordination Centres, COM (2018) 630 final, Brusel1s 2. September 2018 (addresses AI in the context of cybersecurity in recital (14).
[184] European Commission, Proposal for a Regulation of the European Parliament and of the Council establishing the Digital Europe programme for the period 2021-2027, COM (2018) 434 final, Brussels, 6.6.2018, Explanatory memorandum.

Legal issue – Robotics	Relevant EU legislation (examples)
	• Council Regulation (EC) No 428/2009 of 5 May 2009 setting up a Community regime for the control of exports, transfer, brokering and transit of dual-use items
Safety and control issues of robots particularly those affecting the right to life and/or bodily integrity	• TFEU Articles 4(2)(f), 12, 114 and 169 • EU Charter of Fundamental Rights articles 2-4, article 38 • Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast) • Council Directive 93/42/EEC of 14 June 1993 concerning medical devices • Directive 98/79/EC of the European Parliament and of the Council of 27 October 1998 on in vitro diagnostic medical devices • Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91
Ascribing liability for malicious or non-malicious use of robots	• TFEU Articles 4(2)(f), 12, 114 and 169 • EU Charter of Fundamental Rights articles 38, 47 • Council Directive 85/374/EEC of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products (Product Liability Directive) • Directive 2009/103/EC of the European Parliament and of the Council of 16 September 2009 relating to insurance against civil liability in respect of the use of motor vehicles, and the enforcement of the obligation to insure against such liability
Privacy invasions by robots	• EU Charter of Fundamental Rights, Articles 7-8 • Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) • Directive (EU) 2016/680 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data by competent authorities for the purposes of the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, and on the free movement of such data, and repealing Council Framework Decision 2008/977/JHA (Police Directive) • Directive (EU) 2016/681 of the European Parliament and of the Council of 27 April 2016 on the use of passenger name record (PNR) data for the prevention, detection, investigation and prosecution of terrorist offences and serious crime • Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications)
Replacement of human workers and job losses	• TEU article 3(1), (3) • TFEU article 9, 107(3)(a), articles 145-166, • EU Charter of Fundamental Rights articles 14-15, 27-32

Legal issue – Robotics	Relevant EU legislation (examples)
	• Regulation (EU) No 1304/2013 of the European Parliament and of the Council of 17 December 2013 on the European Social Fund and repealing Council Regulation (EC) No 1081/2006
Consumer protection issues related to use of robotic applications	• TFEU Articles 4(2)(f), 12, 114 and 169 • EU Charter of Fundamental Rights articles 38 • Directive 2005/29/EC of the European Parliament and of the Council of 11 May 2005 concerning unfair business-to-consumer commercial practices in the internal market and amending Council Directive 84/450/EEC, Directives 97/7/EC, 98/27/EC and 2002/65/EC of the European Parliament and of the Council and Regulation (EC) No 2006/2004 of the European Parliament and of the Council ('Unfair Commercial Practices Directive') • Directive 2011/83/EU of the European Parliament and of the Council of 25 October 2011 on consumer rights, amending Council Directive 93/13/EEC and Directive 1999/44/EC of the European Parliament and of the Council and repealing Council Directive 85/577/EEC and Directive 97/7/EC of the European Parliament and of the Council • Directive 2009/103/EC of the European Parliament and of the Council of 16 September 2009 relating to insurance against civil liability in respect of the use of motor vehicles, and the enforcement of the obligation to insure against such liability
Intellectual property issues	• TFEU, Article 118 • EU Charter of Fundamental Rights article 17 (2) • Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society • Directive 2006/115/EC of the European Parliament and of the Council of 12 December 2006 on rental right and lending right and on certain rights related to copyright in the field of intellectual property (codified version) • Directive 2001/84/EC of the European Parliament and of the Council of 27 September 2001 on the resale right for the benefit of the author of an original work of art • Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs (Codified version) • Directive 2004/48/EC of the European Parliament and of the Council of 29 April 2004 on the enforcement of intellectual property rights • Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases • Directive 2012/28/EU of the European Parliament and of the Council of 25 October 2012 on certain permitted uses of orphan works • Directive 98/71/EC of the European Parliament and of the Council of 13 October 1998 on the legal protection of designs • Regulation (EU) No 1257/2012 of the European Parliament and of the Council of 17 December 2012 implementing enhanced cooperation in the area of the creation of unitary patent protection • Regulation (EU) 2017/1001 of the European Parliament and of the Council of 14 June 2017 on the European Union trade mark • Directive (EU) 2016/943 of the European Parliament and of the Council of 8 June 2016 on the protection of undisclosed know-how and business information (trade secrets) against their unlawful acquisition, use and disclosure

Table 6: Robotics legal issues and examples of relevant EU legislation

As outlined in the context of AI, for robotics too, the EU hard law legislation provides mainly a general framework, within which specific robotic issues may be addressed by applying principles of a wider scope. In certain areas, such application of existing concept to robotics may however be difficult in practice. This might especially be problematic in the spheres of safety and liability for damages caused by robots, predominantly due to their ability of autonomous (or semi-autonomous) decision-making.[185] However, this is also a domain where the European Commission and the European Parliament are the most active, thus this picture may soon change. To a certain extent, it is also already changing, with an introduction of the notion of unmanned aircraft operating autonomously to the regulation on common rules in the field of civil aviation civil aviation,[186] and the proposal to introduce special safety rules for automated motor vehicles.[187]

5.3. Examination of specific legal issues

This section takes a closer look at EU legislation (including soft law sources and some forthcoming acts) in relation to the same four selected issues that were studied at the national level. For AI, these are:

- Algorithmic bias and discrimination (including automated decision-making systems),
- Intellectual property issues related to works created by AI.

For robotics, these are:

- Creation of a specific legal status for robots
- Safety and civil liability issues: who is liable for damage caused by robots?

5.3.1 Algorithmic bias and discrimination (including automated decision-making systems)

Issues of algorithmic bias and discrimination may be addressed by the general EU non-discrimination legal framework. On the level of EU primary law, this includes: articles 2 (equality and non-discrimination principle as one of the fundamental values of the Union), article 3 (3) (duty to combat social exclusion and discrimination and promote social justice and protection, equality between

[185] E.g., European Commision, Digitising European Industry. Reaping the full benefits of a Digital Single Market, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM/2016/0180 final, Brussels, 19.4.2016, p. 15; European Commision, "Building A European Data Economy", Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2017) 9 final, Brussels, 10.1.2017, p. 4.

[186] Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91,OJ L 212, 22.8.2018.

[187] European Commission, Proposal for a regulation of the European parliament and of the council on type-approval requirements for motor vehicles and their trailers, and systems, components and separate technical units intended for such vehicles, as regards their general safety and the protection of vehicle occupants and vulnerable road users, amending Regulation (EU) 2018/… and repealing Regulations (EC) No 78/2009, (EC) No 79/2009 and (EC) No 661/2009, COM(2018) 286 final, Brussels, 17.5.2018

women and men, solidarity between generations and protection of the rights of the child) and article 9 (duty to observe the principle of the equality of its citizen) of the Treaty of the European Union (TEU)[188]; article 10 of the Treaty on the Functioning of the European Union[189] (duty to combat discrimination based on sex, racial or ethnic origin, religion or belief, disability, age or sexual orientation, when defining and implementing its policies and activities); as well as the following provisions of the Charter of Fundamental Rights of the European Union[190]: article 20 (equality before the law), article 21 (Non-discrimination), article 22 (cultural, religious and linguistic diversity), article 23 (Equality between women and men), article 24 (the rights of the child), article 25 (the rights of the elderly) and article 26 (integration of persons with disabilities) of the Charter of Fundamental Rights of the European Union. Furthermore, the non-discrimination legal framework includes following secondary law acts: the Employment Equality Directive[191] (prohibition of discrimination on the basis of sexual orientation, religion or belief, age and disability, in the area of employment), Racial Equality Directive[192] (prohibition of discrimination on the basis of race or ethnicity in the context of employment, in accessing the welfare system and social security, as well as goods and services), Gender Goods and Services Directive[193] (prohibition of sex discrimination in the area of goods and services), Gender Equality Directive (recast – prohibition of sex discrimination in employment, social security and broader welfare system) , as well as the directives in the area of state social security (Directive 79/7/EEC)[194], equal treatment between self-employed men and women (Directive 2010/41/EU),[195] relating to pregnancy (Directive 92/85/EEC)[196]and parental leave (Directive 2010/18/EU).[197]

The GDPR, regulating inter alia some aspects of automated processing of personal data and automated decision-making, could provide protection more specifically relevant to algorithmic bias and discrimination. Recital 71 of the GDPR requires the controller (a person or body that determines the purposes and means of the processing of personal data) to ”implement technical and organizational measures” that ”prevent, inter alia, discriminatory effects on natural persons on the basis of racial or ethnic origin, political opinion, religion or beliefs, trade union membership, genetic or health status or sexual orientation, or that result in measures having such an effect”. Furthermore article 9 of the GDPR

[188] Consolidated version of the Treaty on European Union, *OJ C* 326, 26.10.2012.
[189] Consolidated version of the Treaty on the Functioning of the European Union, *OJ C* 326, 26.10.2012.
[190] Charter of Fundamental Rights of the European Union, *OJ C* 326, 26.10.2012.
[191] Council, Directive 2000/78/EC of 27.11.2000 establishing a general framework for equal treatment in employment and occupation, *OJ L* 303, 02/12/2000.
[192] Council, Directive 2000/43/EC of 29.06.2000 implementing the principle of equal treatment between persons irrespective of racial or ethnic origin, *OJ L* 180, 19.7.2000.
[193] Council, Directive 2004/113/EC of 13.12.2004 implementing the principle of equal treatment between men and women in the access to and supply of goods and services, *OJ L* 373, 21.12.2004.
[194] European Parliament and the Council, Directive 2006/54/EC of 5.07.2006 on the implementation of the principle of equal opportunities and equal treatment of men and women in matters of employment and occupation (recast), *OJ L* 204, 26.7.2006.
[195]European Parliament and the Council, Directive 2010/41/EU of 7.07.2010 on the application of the principle of equal treatment between men and women engaged in an activity in a self-employed capacity and repealing Council Directive 86/613/EEC, *OJ L* 180, 15.7.2010.
[196] Council, Directive 92/85/EEC of 19.10.1992 on the introduction of measures to encourage improvements in the safety and health at work of pregnant workers and workers who have recently given birth or are breastfeeding (tenth individual Directive within the meaning of Article 16 (1) of Directive 89/391/EEC) *OJ L* 348, 28.11.1992.
[197] Council, Directive 2010/18/EU of 8 .03.2010 implementing the revised Framework Agreement on parental leave concluded by BUSINESSEUROPE, UEAPME, CEEP and ETUC and repealing Directive 96/34/EC (Text with EEA relevance), *OJ L* 68, 18.3.2010.

sets out special rules for processing of sensitive personal data revealing these traits, while article 22 (4) addresses automated individual decisions based on these data. More generally, the GDPR refers to the principle of fairness of processing (article 5(1)(a) - processing that creates discrimination is considered unfair[198]) and principle of accuracy (article 5(1)(d) - inaccuracy of data processed by an algorithm has been identified as one of potential sources of bias[199]).

The GDPR contains several guarantees that are considered to indirectly address algorithmic bias and discrimination by allowing it to be detected, rectified and where needed, remedies to be sought, such as the general principle of transparency (article 5(1)(a)) and connected right to be informed and right of access (articles 13-15), including right to a meaningful information about the 'logic involved' in case of the automated decision-making (article 13(2)(f), article 14(2)(g), article 15(1)(h), recital (71)), sometimes referred, though not without controversy, as a "right to an explanation".[200] Other measures that could be used to detect algorithmic bias or discrimination include data protection impact assessments (article 35), required in particular in case of using new technologies (article 35(1)) and in case of a systematic and extensive evaluation of personal aspects relating to natural persons which is based on automated processing (article 35 (3) (a)).[201]

In relation to algorithms used to process personal data in the context of law enforcement operations, the Police Directive[202] includes similar relevant principles, referring to principle of fairness (article 4 (1) (a)) and accuracy (article 4 (1)(c), laying down special procedure for processing of sensitive personal data (article 10) and explicitly prohibiting profiling that results in discrimination against natural persons on the basis of the sensitive of personal data (article 11(3)). It also guarantees a limited right to be informed and right of access (articles 13-14) and calls for data protection impact assessment (article 27) where processing, in particular, using new technologies is likely to result in a high risk to the rights and freedoms of natural person.

Moreover, in a specific context of use of passenger name record (PNR) for the prevention, detection, investigation and prosecution of terrorist offences and serious crime, the directive 2016/681 requires that positive matches resulting from automated processing have to be individually reviewed by non-automated means (article 6) and the competent authorities cannot take any decisions that would significantly affect a person only by reason of the automated processing of passenger name record data (article 7 (6)). The criteria of processing for assessment of passenger cannot be based on a

[198] Article 29 Data Protection Working Party, Guidelines on Automated individual decision-making and Profiling for the purposes of Regulation 2016/679, WP251rev.01, 6 February 2018, p. 10.
[199] Ibid, p. 12.; Fundamental Rights Agency, #BigData: Discrimination in data-supported decision making #BigData: Discrimination in data-supported decision making, May 2018, p. 10-11.
[200] Goodman and Flaxman, op. cit., 2017, pp. 50-57 [55-56]; Goodman, Bryce., "A Step Towards Accountable Algorithms? : Algorithmic Discrimination and the European Union General Data Protection", 29th Conference on Neural Information Processing Systems, Barcelona, Spain, 2016.; critically: Wachter et al, op. cit., 2017.
[201] Article 29 Data Protection Working Party, op. cit. 2018, p. 27; Fundamental Rights Agency, op. cit., 2018, p. 8; on #bigdata; Goodman, op. cit., 2016, p. 4.
[202] European Parliament and the Council, Directive (EU) 2016/680 of 27.04.2016 on the protection of natural persons with regard to the processing of personal data by competent authorities for the purposes of the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, and on the free movement of such data, and repealing Council Framework Decision 2008/977/JHA, *OJ L* 119, 4.5.2016.

person's race or ethnic origin, political opinions, religion or philosophical beliefs, trade union membership, health, sexual life or sexual orientation (article 6(4)).[203]

As for the soft law, the European Commission in its Communication from April 2018 "Artificial Intelligence for Europe"[204] indicated three general ways of addressing the algorithmic bias and discrimination, namely: involving "more women and people of diverse backgrounds, including people with disabilities" in the development of AI; supporting "research into explainability of AI systems" and supporting the design of policy responses to the challenges brought by automated decision-making.

The problem of algorithmic bias and discrimination was also tackled by the European Parliament. In its resolution from March 2017 on fundamental rights implications of big data: privacy, data protection, non-discrimination, security and law-enforcement[205], the Parliament among others called on the Commission, the Member States and data protection authorities to evaluate the need for algorithmic transparency and transparency about possible biases in the training data used to make inferences based on big data; it recommended that business conduct regular assessments into the representativeness of data sets and consider whether data sets are affected by biased element, as well as called on the Member States' law enforcement authorities that make use of data analytics to "assess the appropriateness of each decision to be taken on the basis of that information".[206]

Furthermore, in the resolution from February 2019 on a comprehensive European industrial policy on artificial intelligence and robotics,[207] the Parliament called for inclusion of considerations around fairness at all stages of developing and using algorithms, including "development of protocols for the ongoing monitoring and detection of algorithmic bias". In a similar vein to Commission, the Parliament called for addressing developer bias by inclusion of a "diverse workforce in all branches of the IT sector".[208] More specifically, the Parliament urged the Commission to "take note of the social challenges arising from practices resulting from the ranking of citizens" and stressed that "citizens should not be subjected to discrimination on the basis of their ranking and that they should be entitled to 'another chance'".[209]

Additionally, European Data Protection Supervisor co-authored Declaration On Ethics and Data Protection in Artificial Intelligence of October 2018, inter alia, stressed that "Unlawful biases or discriminations that may result from the use of data in artificial intelligence should be reduced and mitigated", including by e.g. "investing in research into technical ways to identify, address and mitigate biases," and by " taking reasonable steps to ensure the personal data and information used in

[203] European Parliament and Council, Directive (EU) 2016/681 of the of 27 April 2016 on the use of passenger name record (PNR) data for the prevention, detection, investigation and prosecution of terrorist offences and serious crime, *OJ L* 119, 4.5.2016.
[204]European Commission, Artificial Intelligence for Europe, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM (2018) 237 final, Brussels, 25.4.2018. https://ec.europa.eu/digital-single-market/en/news/communication-artificial-intelligence-europe
[205] European Parliament, Resolution of 14 March 2017 on fundamental rights implications of big data: privacy, data protection, non-discrimination, security and law-enforcement (2016/2225(INI)).
[206] Ibid., section 32.
[207] European Parliament, Resolution of 12 February 2019 on a comprehensive European industrial policy on artificial intelligence and robotics (2018/2088(INI)).
[208] Ibid., section 168.
[209] European Parliament, Resolution of 12 February 2019, op. cit., section 12.

automated decision making is accurate, up-to-date and as complete as possible among others for reduction and mitigation of unlawful biases".[210]

In a different context, some of existing (or forthcoming) EU laws encourage or require the use of automated means of moderating on-line content and as such inherently carry the risk of algorithmic bias and discrimination. These include soft law instruments such as Commission's Communication on Tackling Illegal Content On-line[211] and Commission Recommendation on measures to effectively tackle illegal content online,[212] and the proposal for a hard law regulation on preventing the dissemination of terrorist content online.[213] All these acts refer to some forms of safeguards against erroneous (including, presumably, biased) decisions reached by automated moderation tools, i.e., respectively, possibility to "contest this decision via counter-notice"[214], "human oversight and verifications".[215]

5.3.2 Intellectual property issues related to works created by AI

EU intellectual property legislation is constituted of copyright laws (a set of eleven directives and two regulations[216], including the Copyright Directive[217], the Software Directive[218], the Database Directive[219] and the Copyright Term Directive[220]), patent framework[221], trade mark legislation[222], industrial design

[210] Commission Nationale de l'Informatique et des Libertés, European Data Protection Supervisor and Garante per la protezione dei dati personali, Declaration On Ethics and Data Protection in Artifical Intelligence, 40th International Conference of Data Protection and Privacy Commissioners, 23.10.2018, Brussels, section 6.
[211]European Commission, Tackling Illegal Content On-line. Towards an enhanced responsibility of online platforms, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and The Committee of The Regions, COM (2017) 555 final, Brussels, 28.9.2017.
[212] European Commission, Recommendation on measures to effectively tackle illegal content online, C(2018) 1177 final, Brussels, 1.3.2018.
[213] European Commission, Proposal for regulation on preventing the dissemination of terrorist content online, COM (2018) 640 final, Brussels, 12.9.2018.
[214] European Commission, Tackling Illegal Content On-line. Towards an enhanced responsibility of online platforms, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and The Committee of The Regions, COM (2017) 555 final, Brussels, 28.9.2017., p. 17.
[215] European Commission, Recommendation on measures to effectively tackle illegal content online, C (2018) 1177 final, Brussels, 1.3.2018, p. 6; European Commission, Proposal for regulation on preventing the dissemination of terrorist content online, COM (2018) 640 final, Brussels, 12.9.2018, article 9.
[216] European Commission, "The EU copyright legislation", https://ec.europa.eu/digital-single-market/en/eu-copyright-legislation
[217] European Parliament and the Council, Directive 2001/29/EC of 22.05. 2001 on the harmonisation of certain aspects of copyright and related rights in the information society, OJ L 167, 22.6.2001.
[218] European Parliament and the Council, Directive 2009/24/EC 23.04.2009 on the legal protection of computer programs (Codified version), *OJ L* 111, 5.5.2009.
[219] European Parliament and the Council, Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases, *OJ L* 77, 27.3.1996.
[220] European Parliament and the Council, Directive 2006/116/EC of the European Parliament and of the Council of 12 December 2006 on the term of protection of copyright and certain related rights (codified version),OJ L 372, 27.12.2006.
[221] European Commission, "Patent protection in the EU". https://ec.europa.eu/growth/industry/intellectual-property/patents_en
[222] European Commission, "Trade mark protection in the EU". https://ec.europa.eu/growth/industry/intellectual-property/trade-mark-protection_en

legislation[223] and trade secret framework.[224] It is generally aimed at promoting innovation and creativity, while at the same time ensuring access to creative content. Protection of intellectual property in relation to works created by artificial intelligence has not been explicitly addressed in the EU law, except for limited statements of the Commission[225] and the European Parliament[226], declaring that these issues should be "explored" in order to verify whether the current regulatory frameworks properly addresses AI challenges. In relation to copyright legislation, some scholars argue that in the light of current jurisprudence of Court of Justice of the European Union (CJEU) on the originality requirement (referring to "author's own intellectual creation", connected to expression of his or her "creative abilities", "creative freedom" and "personal touch"[227]), the copyright could not be attributed to an AI system[228]

5.3.3. Creation of a specific legal status for robots

In the resolution from February 2017 on Civil Law Rules on Robotics, the European Parliament referred to legal status for robots in the context of civil liability for damage caused by robots. The reference was made in a rather cautious manner, i.e., the Parliament called on the Commission to "explore, analyse and consider the implications of all possible legal solutions" when "carrying out an impact assessment of its future legislative instrument" in the context of civil liability. One of the indicated possible solutions was "creating a specific legal status for robots in the long run, so that at least the most sophisticated autonomous robots could be established as having the status of electronic persons responsible for making good any damage they may cause, and possibly applying electronic personality to cases where robots make autonomous decisions or otherwise interact with third parties independently"[229]. The proposal was harshly criticised in an open letter issued by "Artificial Intelligence and Robotics Experts, industry leaders, law, medical and ethics experts".[230] Addressing the criticism, MEP Mady Delvaux, the Rapporteur of the motion for the Resolution, explained that "this proposal was made among others (6 proposals) and ONLY in the context of liability issues" and that "the goal is not to grant human status and rights to robots. A robot is a machine and will never be considered as a human. In order to ensure compensation to victims, some experts proposed to study the possibility of

[223] European Commission, "Industrial design protection". https://ec.europa.eu/growth/industry/intellectual-property/industrial-design/protection_en
[224] European Commission, "Trade secrets". http://ec.europa.eu/growth/industry/intellectual-property/trade-secrets_en
[225]European Commission, Communication "Artificial Intelligence for Europe", op. cit., 25 April 2018, point 3.3.; European Commission, Annex to the Coordinated Plan on Artificial Intelligence, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2018) 795 final, Brussels, 7.12.2018, p.18.
[226] European Parliament, Resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)); European Parliament, Resolution of 12 February 2019 on a comprehensive European industrial policy on artificial intelligence and robotics;
[227]Court of Justice of the European Union, Joined Case C-403/08 and C-429/08, Football Association Premier League Ltd et al v. QC Leisure et al, 4 October 2011; Court of Justice of the European Union, Case C-145/10 Eva-Maria Painer v. Standard Verlages GmbH et al, 1 December 2011.
[228] Ballardini, Rosa Maria, He Kan and Teemu Roos, "AI-Generated Content: Authorship and Inventorship in the Age of Artificial Intelligence", in Taina Pihlajarinne, Juha Vesala, Olli Honkila (ed.) *Online Distribution of Content in the EU*, Edward Elgar, Cheltenham, 2019, pp. 117-136 [pp. 124-125].
[229] European Parliament, resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)), point 59 (f)
[230] "Open Letter to the European Commission Artificial Intelligence and Robotics", http://www.robotics-openletter.eu/

granting a legal status functioning a little bit like the status of companies in case an accident with a robot occurs and the autonomy of the robot does not permit to held a person liable."[231]

5.3.4 Safety and civil liability issues: who is liable for damage caused by robots?

Liability is primarily a national competence and hence it is hardly harmonised at the EU level – in different Member States, the victims of damages may invoke national, non-harmonised principles of fault-based or varied strict liability systems. However, EU law governs the product liability regime, which may be perceived as part of a wider EU product safety and liability rules "aiming to provide trust and safety to consumers".[232] Product safety legislation sets the safety levels that products placed on the internal market must meet. It consists of General Product Safety Directive[233] and many sector-specific acts, among which the Machinery Directive is the most relevant for robots.[234] The Product liability framework, governed by Product Liability Directive, provides for the liability of producers for defective products that cause damage to consumers. It establishes a strict liability, i.e., in general the producer may be held liable for the damage caused by a defective product even without negligence or fault on his part.[235] The two frameworks are complementary in the sense that product liability legislations allow one to seek redress ex-post for damages suffered due to defective products, while product safety legislation aims to prevent damages ex-ante, by ensuring safety of products on the internal market.[236]

Thus, damage caused by robots may be analysed in individual cases under different liability regimes at the same time. For example, when it comes to damages caused by operation of a motor vehicle (one of key emerging issues in the context of automated cars), they may trigger the product liability regime governed by EU law (if they result from a defect of the vehicle), but also substantive traffic law and civil law liability rules which in general fall within the competences of the Member States and vary

[231] Delvaux, Mady, "Fake News in the Open Letter on Robotics and AI". http://www.mady.lu/fake-news-in-the-open-letter-on-robotics-and-ai/

[232] European Commission Staff, Working Document on liability for emerging digital technologies, op. cit. 25.4.2018, p. 4.

[233] European Parliament and the Council, Directive 2001/95/EC of 3 December 2001 on general product safety, *OJ L* 11, 15 January 2002.

[234] Other, potentially also relevant, include e.g. European Parliament and the Council, Directive 2014/53/EU of 16.04. 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment; Council Directive 93/42/EEC of 14.06.1993 concerning medical devices *OJ L* 169; European Parliament and the Council Directive 2014/35/EU of 26.0.2 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits, *OJ L* 96, 29.3.2014 , and many others

[235]European Commission, Application of the Council Directive on the approximation of the laws, regulations, and administrative provisions of the Member States concerning liability for defective products (85/374/EEC), Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee, COM(2018) 246 final, Brussels, 7.5.2018, p. 1.

[236] European Commission Staff, Evaluation of Council Directive on the approximation of the laws, regulations, and administrative provisions of the Member States concerning liability for defective products, Working Document Accompanying the document Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee on the Application of the Council Directive on the approximation of the laws, regulations, and administrative provisions of the Member States concerning liability for defective products (85/374/EEC), SWD(2018) 157 final, Brussels, 7.5.2018, p. 8.

from fault-based to liability to different forms of semi-strict or strict liability regimes[237] (the EU Motor Insurance Directive[238] only imposes an obligation on all motor vehicles to be covered by compulsory third party insurance, but does not regulate substantive liability rules[239]).

In the last three years, safety and civil liability issues have been perhaps the most analysed legal aspect of robotics on the EU level. The European Commission has addressed this in a number of documents. In Communication "Digitising European Industry" from April 2016,[240] the EC noted that "autonomously acting systems such as self-driving cars or drones pose a challenge to current safety and liability rules where a legal person is ultimately responsible" and declared that it will "explore the legal framework" for such systems, "in particular safety and liability rules". Furthermore, in the Communication "Building a European Data Economy" of January 2017[241], the Commission observed that phenomena of "autonomous machines, whose unexpected and unintended behaviour could create damages to persons and objects" may create "legal uncertainty in relation to the application of the existing framework on liability and safety" and announced that the Commission's "objective is to enhance legal certainty with regard to liability" in this context. Similarly, in the Digital Single Term mid-term review from May 2017,[242] the Commission proclaimed that it "will consider the possible need to adapt the current legal framework to take account of new technological developments (including robotics, Artificial Intelligence and 3D printing), especially from the angle of civil law liability".[243]

In line with these declarations, in 2016, the Commission launched parallel evaluations of the Machinery Directive and the Product Liability Directive, which results were published on in May 2018.[244] Both assessments were conducted in a broader context of a regular evaluation of the acquis[245] and were not limited only to the analysis of their suitability for emerging technologies though this aspect was

[237] Evas, Tatjana, "The European added value of a common EU approach to liability rules and insurance for connected and autonomous vehicles. Study", European Parliamentary Research Service, Impact Assessment and European Added Value Directorate, European Added Value Unit, Brussels 2018, http://www.europarl.europa.eu/RegData/etudes/STUD/2018/615635/EPRS_STU(2018)615635_EN.pdf, p. 12.
[238] European Parliament and of the Council, Directive 2009/103/EC of 16.09.2009 relating to insurance against civil liability in respect of the use of motor vehicles, and the enforcement of the obligation to insure against such liability, OJ L 263, 7.10.2009.
[239] Evas, Tatjana, op. cit. 2018.
[240] European Commision, Digitising European Industry. Reaping the full benefits of a Digital Single Market, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM/2016/0180 final, Brussels, 19.4.2016.
[241] European Commision, "Building A European Data Economy", Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2017) 9 final, Brussels, 10.1.2017
[242] European Commision, Mid-Term Review on the implementation of the Digital Single Market Strategy, A Connected Digital Single Market for All, COM(2017) 228 final, Brussels, 10.5.2017,
[243] Ibid.
[244] European Commision, "Commission publishes evaluation reports on EU rules on machinery safety and product liability", 07.05.2018 https://ec.europa.eu/growth/content/commission-publishes-evaluation-reports-eu-rules-machinery-safety-and-product-liability_en .
[245] As to the Machinery Directive, the Commissions made reference to its Regulatory Fitness and Performance (REFIT) programme as a general rationale for the evaluation, while in the case Product Liability Directive, the Commission invoked the article 21 of the Product Liability Directive itself , which explicitly obliges the Commission to report every five years to the Council on the application of this Directive and, if necessary, submit appropriate proposals to it.

explicitly emphasised as one of the crucial challenges in the Commission's reports.[246] On this very aspect, the evaluations did not reach definitive conclusions and in relation to both Directives the Commission announced that it will further analyse this theme.[247] In case of Product Liability Directive it additionally declared it will issue interpretative guidance in mid-2019 to facilitate a common understanding of the Directive's key concept and to further clarify to what extent it applies to emerging technologies [248]. However, already in the reports from the evaluations the Commission did identity key prima facie challenges brought by new technologies for both acts. As to the Product Liability Directive, the Commission observed that characteristics of emerging technologies, such as complexity and autonomy, lead to questions about what separates a product from a service (the Directive applies only to products[249]), the scope of damage covered (limited under the Directive to material damage) and the notion of what constitutes a defect.[250] In case of the Machinery Directive, the Commission indicated specifically that it is not clear to what extant the Directive accommodates certain aspects of emerging technologies it does not explicitly address, such as collaboration of humans and machines in shared workspaces (and, in this context, for example whether safety issue should be limited to physical ailments or perhaps encompass as well emotional damages).[251]

Following the declarations on the further analysis, the Commission created the Expert Group on Liability and New Technologies, with two objectives: to "provide the Commission with expertise on the applicability of the Product Liability Directive to traditional products, new technologies and new societal challenges (Product Liability Directive formation) and to "assist the Commission in developing principles that can serve as guidelines for possible adaptations of applicable laws at EU and national level relating to new technologies (New Technologies formation)"[252]. The Group was appointed in June 2018. Based on their work, the Commission will publish by mid-2019 two documents: a guidance on the interpretation of interpretation of the Product Liability Directive in light of technological developments and a report on the broader implications for, potential gaps in and orientations for, the liability and safety frameworks for AI, the Internet of Things and robotics.

Building upon its preliminary work, including the evaluations of Product Liability Directive and Machinery, the Commission, in April 2018, published a Commission Staff Working Document on

[246] European Commission, Application of the Council Directive on the approximation of the laws, regulations, and administrative provisions of the Member States concerning liability for defective products (85/374/EEC), Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee, COM(2018) 246 final, Brussels, 7.5.2018, p. 1.
[247] European Commission Staff, Evaluation of the Machinery Directive, Working Document, SWD(2018) 160 final, Brussels, 7.5.2018, p.4.
[248] European Commision, "Commission publishes evaluation reports on EU rules on machinery safety and product liability", 07.05.2018 https://ec.europa.eu/growth/content/commission-publishes-evaluation-reports-eu-rules-machinery-safety-and-product-liability_en
[249] Court of Justice of the European Union, Case C-52/00, *Commission of the European Communities v French Republic,* 25 April 2002
[250] European Commission, Application of the Council Directive on the approximation of the laws, regulations, and administrative provisions of the Member States concerning liability for defective products (85/374/EEC), Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee, COM(2018) 246 final, Brussels, 7.5.2018, p. 9.
[251] European Commission Staff, Evaluation of the Machinery Directive, Working Document, SWD(2018) 160 final, Brussels, 7.5.2018, p. 30.
[252] European Commission, Register of Commission expert groups and other similar entities, Expert Group on liability and new technologies (E03592).
http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=3592

Liability for emerging digital technologies as a document accompanying the Commission's Communication "Artificial intelligence for Europe".[253] In the context of robots, the document emphasised legal challenges linked among others to their autonomy and self-learning abilities, i.e., to what extant the producer maintain control over characteristics of a product and can be therefore held liable for them and more generally about liability "in situations where the damage caused by a machine operating with a certain degree of autonomy cannot be linked to a defect or a human wrongdoing".[254] In terms of solutions, the document seems to lean towards a strict liability approach for AI-powered devices connected with some form of obligatory insurance by various actors in the chain of production – since, it claims, damages resulting from the use of them cannot be avoided and such an approach would guarantee that potential victims are compensated by a liable person, regardless of any wrongdoing and in case of the his or her insolvency.[255] This is not however explicitly endorsed as a concrete proposal; and above all, it should be noted that the document "should be understood as the Commission's services analysis of the matters under discussion, and do not constitute political commitments from the part of the Commission"[256].

The European Parliament has also addressed the issue of safety and civil liability of robots. In February 2017, it adopted a resolution with recommendations to the Commission on Civil Law Rules on Robotics.[257] The Parliament's assumed that among different areas of potential rules governing robots, civil liability issues should be the starting point of regulatory actions.[258] In this Resolution, the Parliament seems to adopt a more conclusive, unequivocal stand than the Commission as to the applicability of current rules on damages caused autonomous robots, claiming that in such cases "the traditional rules will not suffice … since they would not make it possible to identify the party responsible for providing compensation and to require that party to make good the damage it has caused".[259] It also addresses the obsoleteness of the current legal framework of contractual liability in cases of "machines designed to choose their counterparts, negotiate contractual terms, conclude contracts and decide whether and how to implement them".[260] With such shortcomings in mind, the Parliament requested the Commission to a proposal for a directive on civil law rules on robotics.[261] The Resolution also includes more specific regulatory solutions proposed to be considered by the Commission, such as a system of registration of advanced robots (for the purposes of traceability);[262] obligatory insurance scheme (as a possible solution to the complicating of allocating responsibility for damage caused increasingly autonomous robots)[263] or "creating a specific legal status for robots in the long run"[264] (discussed below). In its response to the Resolution, the Commission in May 2017 addressed some these proposals with a more precautionary approach: in general, it stated that a

[253] European Commission Staff, Working Document on liability for emerging digital technologies, COM(2018) 237 final, Brussels, 25.4.2018. https://ec.europa.eu/digital-single-market/en/news/european-commission-staff-working-document-liability-emerging-digital-technologies
[254] Ibid. p. 8.
[255] European Commission Staff, Working Document on liability for emerging digital technologies, op. cit., 2018, p. 21.
[256] European Commission Staff, Working Document on liability for emerging digital technologies, op. cit., p. 4.
[257] European Parliament resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)).
[258] Ibid. section AD.
[259] European Parliament resolution of 16 February 2017, op. cit., section AF
[260] European Parliament resolution of 16 February 2017, op. cit., section AG
[261]European Parliament resolution of 16 February 2017, op. cit., section 65
[262]European Parliament resolution of 16 February 2017, op. cit., section 2.
[263] European Parliament resolution of 16 February 2017, op. cit., section 57.
[264]European Parliament resolution of 16 February 2017, op. cit., section 59. (F)

"thorough examination of the existing robotics technologies and assessment of their potential development is necessary", and that this would help to identify technologies for which a system of registration could be relevant. It admitted that "Insurance schemes would be instrumental in the context of both risk-based solutions or a review of the current Directive" (on Product Liability), agreeing that an insurance system for robotics "needs to be well thought through"[265].

In the resolution from February 2019 on a comprehensive European industrial policy on artificial intelligence and robotics, the Parliament upheld its somewhat more proactive position on adopting new regulation in the field – it welcomed the Commission's initiative to create the Expert Group on Liability and New Technologies, but "regretted that no legislative proposal was put forward during this legislature, thereby delaying the update of the liability rules at EU level and threatening the legal certainty across the EU in this area for both traders and consumers".[266]

Beside approaching the issues of safety and liability of robots in general, there are two sectors, where these questions are addressed with more urgency, namely: unmanned aerial vehicles (drones) and autonomous motor vehicles (self-driving cars).

With respect to drones, in July 2018, the Regulation on common rules in the field of civil aviation[267] was adopted, described as the "first ever EU-wide rules for civil drones of all sizes".[268] Its overall aim is to ensure a common level of safety and legal certainty for drone operators and producers across the EU.[269] It covers any unmanned aircraft, understood as an aircraft piloted remotely without a pilot on board *or operating autonomously*[270]. Moreover its notion of a 'remote pilot' refers not only to person manually operating flight controls, but also, when an aircraft flies *automatically*, to the person operating by "monitoring its course and remaining able to intervene and change the course at any time".[271] Regulations do not directly address the issue of liability.[272] However, the Annex to the Regulations provides that the operator of an unmanned aircraft is responsible for the operation and "must take any appropriate actions to ensure the safety of the operation".[273] What's more, the

[265]European Commission, Follow up to the European Parliament resolution of 16 February 2017 on civil law rules on robotics 2015/2103 (INL), SP(2017)310 16/05/2017, https://oeil.secure.europarl.europa.eu/oeil/spdoc.do?i=28110&j=0&l=en, p. 2-3.

[266] European Parliament resolution of 12 February 2019 on a comprehensive European industrial policy on artificial intelligence and robotics (2018/2088(INI)), 131-132.

[267] Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91,OJ L 212, 22.8.2018.

[268] European Council, "Ensuring aviation safety and safe use of drones: Council signs off on EASA reform", Press release 26 June 2018. http://www.consilium.europa.eu/en/press/press-releases/2018/06/26/ensuring-aviation-safety-and-safe-use-of-drones-council-signs-off-on-easa-reform/

[269] European Parliament, "EU-wide rules for safety of drones approved by European Parliament", Press release 12 June-2018. http://www.europarl.europa.eu/news/en/press-room/20180607IPR05239/eu-wide-rules-for-safety-of-drones-approved-by-european-parliament

[270] Article 3(30)

[271] Article 3(31)

[272] Bertolini, Andrea, "Artificial Intelligence and civil law: liability rules for drones. Study", Policy Department for Citizen's Rights and Constitutional Affairs, European Parliament, Brussels, 13.12.2018 http://www.europarl.europa.eu/RegData/etudes/STUD/2018/608848/IPOL_STU(2018)608848_EN.pdf

[273] Annex IX 2.1.7.

Regulations are to a large extent prospective, calling upon the Commission to adopt implementing acts that may further develop upon this aspect (the implementing acts have not been issued yet).[274]

Additionally, in the Communication "New Era for Aviation" form April 2014,[275] the Commission announced that it will assess the current liability regime and third-party insurance requirements framework in the context of drones, while in the 2015 EU Aviation Strategy, the Commission claimed that a liability is one of concerns to be taken into account in setting safety framework for drones.[276] This legal aspect seems, however, to be largely unaddressed to this day.

The European Parliament referred to automated aircraft in the resolution from January 2019 on autonomous driving in European transport, recalling that adopting Regulation on common rules in the field of civil aviation was "very necessary", but at the same time urging the Commission "also to present without delay detailed rules for automated aircraft, which require specific and tailor-made specifications".[277]

As to automated motor vehicles, in May 2018 the Commission adopted a proposal for a revision of the General Safety Regulation for motor vehicles,[278] (the proposal is currently being discussed within the Council's preparatory bodies[279]) which for the first time lays down specific safety requirements for automated vehicles (understood as "a motor vehicle designed and constructed to move autonomously for extended periods of time without continuous human supervision").[280] The proposed regulation states in recital 17 that "as automated vehicles will gradually be taking over tasks of the driver, harmonised rules and technical requirements for automated vehicle systems should be adopted at Union level." The specific safety requirements for automated vehicles relate among others to "driver readiness monitoring systems" and "event (accident) data recorder for automated vehicles."[281]

[274] Bertolini, op. cit., 2018.
[275] European Commission, A new era for aviation Opening the aviation market to the civil use of remotely piloted aircraft systems in a safe and sustainable manner, Communication from the Commission to the European Parliament and the Council, COM(2014) 207 final, Brussels, 8.4.2014
[276] European Commission, An Aviation Strategy for Europe, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2015) 598 final, Brussels, 7.12.2015.
[277] European Parliament resolution of 15 January 2019 on autonomous driving in European transport (2018/2089(INI)), 44-45.
[278] European Commission, Proposal for a regulation of the European parliament and of the council on type-approval requirements for motor vehicles and their trailers, and systems, components and separate technical units intended for such vehicles, as regards their general safety and the protection of vehicle occupants and vulnerable road users, amending Regulation (EU) 2018/… and repealing Regulations (EC) No 78/2009, (EC) No 79/2009 and (EC) No 661/2009, COM(2018) 286 final, Brussels, 17.5.2018
[279] Eur-lex, Procedure 2018/0145/COD COM (2018) 286: Proposal for a Regulation of the European Parliament and of the Council on type-approval requirements for motor vehicles and their trailers, and systems, components and separate technical units intended for such vehicles, as regards their general safety and the protection of vehicle occupants and vulnerable road users, amending Regulation (EU) 2018/… and repealing Regulations (EC) No 78/2009, (EC) No 79/2009 and (EC) No 661/2009. https://eur-lex.europa.eu/legal-content/EN/HIS/?uri=CELEX:52018PC0286
[280] Article 3 (21) of the European Commission, Proposal for a regulation of the European Parliament and of the council on type-approval requirements for motor vehicles and their trailers, op. cit.
[281] Article 11(1) of the European Commission, Proposal for a regulation of the European parliament and of the council on type-approval requirements for motor vehicles and their trailers, op. cit.

The Commission explicitly rejected a need for an additional EU regulation on the liability for motor vehicles at this stage, reiterating that it is addressed by various instruments, such as the Motor Insurance Directive, Product Liability Directive and different liability regimes in the Member States. [282] It stated that the Motor Insurance Directive has recently undergone an evaluation, which concluded that no changes are necessary as regards autonomous vehicles – they will be equally required by the Directive to have third party liability insurance as any other vehicle.[283] The proposal for the revision of the General Safety Regulation for motor vehicles does not, therefore, directly address the liability issue. However, as the Commission explained in in its Communication "On the road to automated mobility", the data recorders for automated vehicles, provided in the Proposal, are to enable a verification of who was driving during the accident (the vehicle's autonomous system or the driver) in order to clarify the actual cause of the accident in the context of attribution of liability.[284]

The European Parliament has addressed the issue of safety and liability of automated motor vehicles in two resolutions. In the resolution on Civil Law and Robotics form February 2017, the Parliament took the view that "the switch to autonomous vehicles will have an impact on" among others, civil responsibility (liability and insurance)".[285] This position was upheld and developed in the Resolution from January 2019 on autonomous driving in European transport, in which the Parliament underlined the need for a clear and harmonised legislation "to clarify and enable the tackling, as soon as possible, of issues of liability", as well obligating the installation of event data recorders.[286]

5.4 Conclusions

The adequacy of the EU legal framework to meet the challenges of AI and robotics is highly differentiated depending on the field. When it comes to the issues of algorithmic transparency and transparency in decision-making, bias and discriminations and personal data protection, it seems that the revised EU data protection framework – with, among others, its reference to automated data processing and automated decision-making – may potentially offer some legal tools to accommodate these challenges and in this regard the EU may be considered a global trailblazer. It is however to a certain extent, still a new instrument and some of its promising provisions leave much space for interpretation (for example the so-called "right to explanation" has already sparked controversies among scholars[287]). Much of its usefulness will therefore depend on the way it is applied by courts in cases (and the CJEU, ultimately). Moreover, its potential effectiveness largely depends on indirect guarantees that may or may not be used by individuals – for example a data subject exerting her or his right of access may use this right to detect algorithmic bias (as a first step to fight the bias), but this will require knowledge, skills, time and willingness.

The assessment of the applicability of existing EU safety and civil liability legislation is also nuanced. Preliminary evaluations commanded by the EC (of the Product Liability, Machinery or Motor Insurance

[282] European Commission, On the road to automated mobility: An EU strategy for mobility of the future, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM/2018/283 final Brussels, 17.5.2018
[283] European Commission, "Public consultation on REFIT review of Directive 2009/103/EC on motor insurance", https://ec.europa.eu/info/consultations/finance-2017-motor-insurance_en. The full conclusions of the evaluation are still forthcoming.
[284] European Commission, On the road to automated mobility, op. cit., 2018.
[285] Section 27.
[286] Section 30.
[287] Goodman and Flaxman op. cit., 2017; Wachter et al, op. cit., 2017.

directive) did not indicate that the current framework is prima facie and evidently obsolete. However, they did leave many questions open and exposed a need for further analysis. Results of the work of the Expert Group on Liability and New Technologies, expected in mid-2019, might be particular informative in this context. At the same time, it remains open to discussion to what extent, in the context of AI and robotics, should the EU law expand to non-harmonised areas of civil liability for damages. In this sphere, it is possible also to notice some discrepancy between the EC and the European Parliament general approaches. Whereas the former is more cautious in its assessment of existing framework and in particular regarding the need to revise current legislation and the necessity to adopt new legislation, the latter seems to be much more critical about the sufficiency of current rules and is consequently to a larger extent pushing for a more proactive legislative approach, calling for revisions and adopting of new law. This difference does not, however, have to be considered as a major problem or a problematic disagreement. The work of both institutions could complement each other in identifying problems on one hand and making sure that legislative responses are well-thought of on the other.

Finally, there are fields, e.g., intellectual property of work created by AI, in which the current EU framework does not provide clear answers to some of the challenges (e.g., who could benefit from the work created by AI?) and at the same time there are no signs indicating that the EU institutions are looking for legal solutions in this respect.

Overall, the EU can be described as being proactive in the field of AI and robotics – various types of documents on the topic are being published almost on a monthly basis. To a certain extent, this may create a problem of coordination between different legislative and regulatory actors involved, including accommodating results of work of various Commission Expert Groups, Commission Staff working documents or studies commissioned by the European Parliament.

6. Analysis of relevant national laws and human rights standards

6.1 Introduction and methodology

This section presents a comparative analysis of the relevant national laws and human rights standards. SIENNA partners carried out research in 2018 (June to December) on the state of the law and current legal responses to developments in AI and robotics and determined how specific questions and issues are addressed their jurisdictions. As outlined in the earlier approach section, 12 country reports were prepared (see the template with instructions and research questions for country reports in the report annex). Each report went through two rounds of drafting and as indicated where feasible, were reviewed by other scholars.

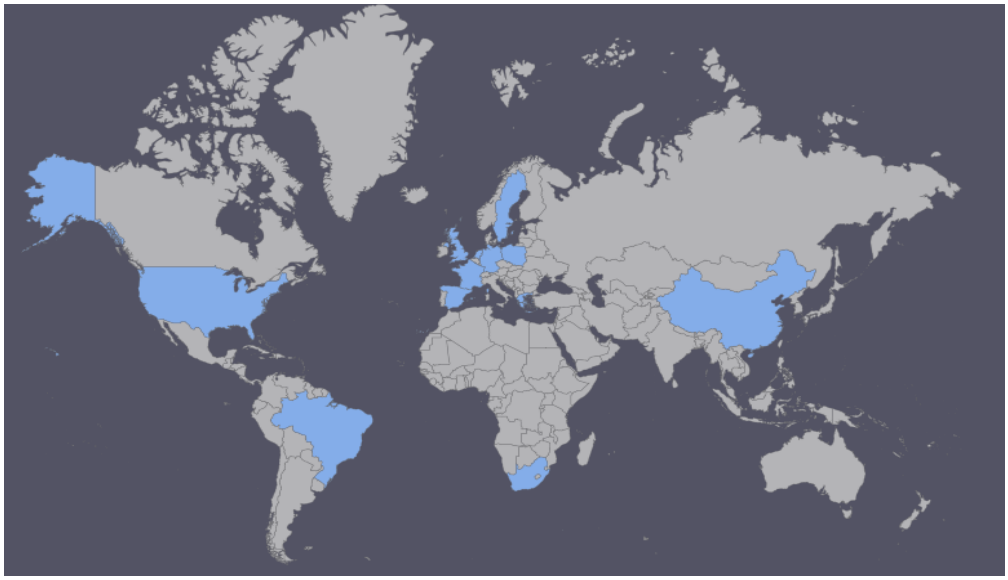

Fig 1: Countries studied

The primary method used in the country research was desk research using legal research and academic databases; the desk research used the methods described in the SIENNA Handbook,[288] i.e., the functional, doctrinal and law-in context methods. The functional method was relied on a lot due to the nature of the topic; the law that is compared was determined by reference to a social problem that is presumed to be similar across different jurisdictions.[289] So it addressed the question of how existing laws deal with issues of AI and/or robotics.

Each of the national reports reviewed the state of the law and current legal responses to developments in AI and robotics and determined how specific questions or issues are addressed. They highlight key legal developments pertaining to AI and robotics covering the last five to ten years and look at developments in AI and/or robotics legislation that may influence constitutional or human rights and attempts or plans to create or adapt legislation to AI and robotics developments. The reports examine role of regulation, case law and creation of new regulatory bodies with regard to how AI and robotics applications are designed, set up, commissioned or used, among others. They explore how law and AI interact with regard to two issues: (i) algorithmic bias and discrimination (including automated decision-making systems), and (ii) intellectual property issues related to works created by AI. For robotics, it explores two issues (i) creation of a specific legal status for robots and (ii) safety and civil liability issues: who is liable for damage caused by robots. A brief analysis of gaps and challenges follows. These issues were selected by the SIENNA team for further study based on the following criteria: (a) their prominence in legal and policy discussions at the international and regional level, (b) their prevalence in policy and legal academic discussions and (c) their potential to impact ethical values and human rights. The next sections present the comparative results.

6.2 Scope of the comparative analysis

As outlined in the SIENNA Handbook, due to resource limitations, it was not possible to carry out a comparison, between different jurisdictions, covering all legal issues and all areas of law applicable to

[288] SIENNA, *D1.1: The consortium's methodological handbook*, 30 April 2018, Section 4.

AI and robotics.[290] Nevertheless, the wide range of countries covered in the project, the combination of general and specific questions for the study of national laws, and the thematic coordination of national research with the analysis of international and regional laws will provide a useful overview of current state of the domestic law and legal responses to some of the key developments.

The comparative study here, is founded on the general reflexive function of comparison, i.e., the function it has for the broadening our sight, widening our horizon and seeing things in perspective.[291] This is particularly true as we study 12 countries – EU and non-EU, representing diverse legal cultures and states of technological progress and implementation of AI and robotics. The comparative analysis will help us consider other national contexts and consider these in a global and international perspective given that the design and application of AI and robotics has both international and local implications.

We acknowledge the challenge of differences between national legal cultures, divergent conceptualisations of laws, rights and approaches to solutions; as feasible, we address this challenge by accounting for the differences, the possible conflicts of rights, and available or proposed solutions. The legal research in SIENNA is not an end to itself but is supported by country-based surveys of ethical codes, ethical analysis and studies of the societal acceptance and awareness.

One challenge encountered in preparing this section was that the data from the national reports was not of equal levels and divergent in depth and breadth depending on the country (and the information available); this has had an impact on the ability of the comparative analysis to peel the layers at much greater depth than might be ideally desired. As this report is a feeder document for further legal work in SIENNA (and the SHERPA projects), it has attempted in the analysis to uncover the variety of legal developments, and how issues are covered or addressed in the different countries.

Sections 6.3 – section 6.8 present and compare the results of the national studies.

6.3 Summary of results of national academic legal discourses on AI and robotics

This section summarises and analyses (non-exhaustively) the key results of the national academic legal discourses on AI and robotics based on data from the SIENNA national reports. It also compares how the specific legal questions are addressed in the countries studied (the time period focussed on was the past five to ten years).

First, we look at the European countries. In **France,** significant academic publications on the legal regulation of AI and robotics published in the past five to ten years cover robots and law, intellectual property and robots, AI and robotics legal issues, civil liability of robots, legal status of robots. The relevant legal debate in **Germany** focuses mainly on big data, autonomous driving cars, robots in health care and impacts of AI developments on privacy, responsibility and safety. Legal academic discourses in **Greece** have focussed on exploring (only remotely) AI and robotics connected to legal issues. There are some significant reports and documents that concern (amongst others) legal issues related to AI and robotics in the **Netherlands** – these have covered AI and the judiciary; data-driven society, big data, liability for semi-autonomous systems, compensation for self-driving vehicles and regulation of unmanned aircraft. Some legal practitioners and legal scholars have expressed their concern regarding

[290] SIENNA, *D1.1: The consortium's methodological handbook*, 30 April 2018, Section 4.4
[291] Azarian, Reza, "Potentials and limitations of comparative method in social science," *International Journal of Humanities and Social Science*, Vol. 1, 4, 2011, pp. 113-125.

the development of AI and robotics. There are barely any legal academic debates on AI and robotics in **Poland (**legal scholars address the issue at the international and European level and the national legal situation is rarely discussed)**.** The robotics and AI legal debate in **Spain** is new and the report suggests was complicated to find any information about these topics due to the lack of information and legislative motions in the Parliament. There are legal academic papers on the rights of robots, advanced robotics and labour relations, constitutional law and AI, and legal problems created by AI. Despite the **Swedish** legislator taking interest in new and emerging technologies, currently, there is a limited number of doctrinal publications relating to AI and robotics relating to areas of interest for SIENNA (though questions of AI have found their place on the legal scholars' agenda). Some topics covered include legal implications of algorithmic trade, predictive modelling, IT and data protection, legal implications of data mining). Legal academic discourses in the **UK** have focussed on exploring legal, social and technological regulatory aspects to autonomous vehicle use; AI, big data and intellectual property, the various opportunities and challenges presented to the law by AI. Other notable legal academic discourses by UK scholars explore AI and robotics legal issues in a broader sense (wider than a UK-scoped study).

Next, we look at the non-EU countries. In **Brazil**, the legal academic discourse on the use of AI & robotics is only starting to emerge. It has focused, thus far, on the relationship between AI and unfair discrimination (algorithmic bias). The implications of AI systems for the judiciary, and the widespread use of AI by law firms, have also attracted the attention of some legal scholars. In **China,** legal academic discourses have focussed on exploring, e.g., legal, social and technological regulatory aspects to autonomous vehicle use, AI, big data and intellectual property, the legal status and responsibilities of robots, and the various opportunities and challenges presented to the law by AI. In **South Africa**, legal academic discourse on AI and robotics is limited to only a few sources, with the main focus being on intellectual property (and specifically authorship of computer programmes) and the regulation of autonomous weapons.[292] There are several recent reports and articles from the government, academia, and the private sector, that have focused on legal issues related to AI and robotics in the USA.

6.4 Where do national policy debates stand?

Not all the national reports identified policy debates or discourses in their research (e.g., there were none reported for **Brazil, Greece** and **South Africa**). In many cases, issues pertaining to AI and robotics have attracted the high-level attention of political parties. E.g., in **China**, a series of related laws and regulations are being prepared or have been issued, and specific time plans for establishing AI laws and regulations have been made. In **France**, AI and robotics have generated much interest from policy makers, regulators, and legal experts and many significant reports have been published on this topic by major French institutions touching to varying degrees, upon questions of the legal regulation of these technologies. In **Germany**, key policy documents have focused to varying degrees on legal issues related to AI&R covering for instance, key points for AI, robotics in the care sector and the law on self-driving cars. In the **Netherlands**, government reports have focussed on: robots and the future of work, people and tech working together, big data, the digital agenda, use of algorithms in the government. In **Poland,** the Ministry of Digital Affairs has set up four working groups to develop materials that will serve as the basis for working out a strategy for AI in Poland and has published in 2018 a lengthy report containing legal analyses of issues such as AI and human rights, access to data, civil law, intellectual

[292] The limited literature on the regulation of autonomous weapons almost falls more into philosophy literature than legal discourse.

property law, customers' rights, labor law, tax law and criminal law.[293] **Spain** has had non-legislative motions discussing for example, the use of AI in business and citizen's rights, creation of international and European cooperation in AI and the use of big data analysis and AI to fight unemployment. AI and robotics have received the **Swedish** legislator's attention, in particular, in public administration and automated decision making and self-driving cars; AI has become Sweden's national focus. In the **UK**, there are some significant Parliamentary and regulatory agency reports that have focused (to varying degrees) on legal issues related to AI and robotics in the UK. In the **USA** too, government bodies have issued policy documents on AI covering emerging opportunities, the future of AI etc. Further details can be found in the individual country reports.

6.5 Comparative analysis of legal developments based on the national reports

This section discusses the findings of the legal developments identified in the country research (the research period covered is last five to ten years).

6.5.1 Have developments in AI and robotics led to amendments in, and/or legislation bearing on constitutional or human rights?

While at the policy-level, a great deal of interest is evident in AI and robotics (especially in relation the pushing forward with AI technology), at the legislative level, our research identified the following developments over the last five to ten years:

- Revisions and changes in data protection law (e.g., **Brazil, Germany, Greece, Netherlands, Poland, Spain, South Africa,[294] United Kingdom, USA**[295])
- Plans to establish AI laws and regulations due to the threats to human rights, e.g., the State Council of the People's Republic of **China**, Development Plan for New Generation of Artificial Intelligence, China.

Overall, there were no major or significant amendments in legislation bearing on constitutional or human rights in direct response to AI and robotics developments reported in the country research for the last five to ten years. In some countries, even in the future this is extremely unlikely to happen (such issues are projected to be left to the courts to adjudicate based on existing laws). However, countries should carry out a robust AI/robotics problems analysis before taking hasty regulatory action.

6.5.2 Plans to create or adopt new legislation in response to developments in AI and robotics

With regard to plans to create or adopt new legislation to specifically regulate 'AI' or 'robotics', we see in most countries, **a cautious response** which has required or left existing laws to be creatively applied by courts or existing regulatory bodies to step in to interpret and enforce them. In some cases, given

[293] Ministry of Digital Affairs, Założenia do strategii AI w Polsce Plan działań Ministerstwa Cyfryzacji (Objectives of AI strategy in Poland Ministry of Digital Affairs Action Plan), 9 November 2018. https://www.gov.pl/web/cyfryzacja/sztuczna-inteligencja-polska-2118

[294] The South African Protection of Personal Information Act (PoPI Act) (expected to commence in 2020) will regulate the processing of personal information.

[295] E.g., See US AB-375 Privacy Act. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180AB375

the level of technological developments and policy, the response has been identified as being 'slow.' For instance, the **Brazil** country report suggests the government has been slow to regulate the use of these technologies. A similar case position seems to be the case for **Greece.**

In some cases, there has been broader legislative movement – e.g., **China** has promulgated the Cybersecurity Law of the People's Republic of China (2016) and the E-Commerce Law of the People's Republic of China (2018) and is preparing the legislation of the Personal Information Protection Law of the People's Republic of China.[296] The **USA** has several pending federal bills related to AI and robotics in the current Congress, though these are seen as unlikely to pass. Proposed legislation includes multiple bills requiring applicants for protected immigration status to submit biometric information,[297] a bill to prevent the import or sale of childlike sex robots,[298] bills to improve cybersecurity in autonomous manufacturing[299] and transportation systems,[300] a bill to establish a job-training program for workers displaced by automation,[301] and several bills to establish advisory councils related to AI and robotics.[302] In **Spain**, there have been draft, Non-legislative Motions to try to regulate AI and the funding of innovation on AI and European and international cooperation, on the use of Big data analysis and AI to fight against unemployment.

There are some **examples of specific types of legislation being implemented** to regulate aspects of AI and robotics. e.g., **China** has promulgated a series of relevant regulations governing aspects of the internet, big data, intelligent driving vehicles, unmanned aircraft, and health care. At the state level in the USA, the most common legislation related to AI and robotics involves autonomous vehicles and unmanned aircraft; many states have also passed laws regarding predictive analytics and algorithmic risk assessment. There have been some developments in **Germany** relating to regulations for drones, and autonomous driving cars. In the **Netherlands**, developments are evident with regards to driverless cars, and remotely piloted aircraft. In **Sweden**, the government has conducted an official inquiry relating to self-driving vehicles, including a draft legislation; it is too early to say if new legislation will be introduced. The **UK** passed the Automated and Electric Vehicles Act 2018 that regulates automated and electric vehicles in the UK.

[296] The laws mentioned are relevant to AI or robotics, and they provide the basis and guarantee for personal information and data protection in relation to AI and robotics development.
[297] Dream Act of 2017, S. 1615, 115th Cong. (2017). https://www.govtrack.us/congress/bills/115/s1615; Agricultural Worker Program Act of 2017, H.R. 2690, 115th Cong. (2017). https://www.govtrack.us/congress/bills/115/hr2690
[298] CREEPER Act of 2017, H.R. 4655, 115th Cong. (2017). https://www.govtrack.us/congress/bills/115/hr4655
[299] New Collar Jobs Act of 2017, H.R. 3393, 115th Cong. (2017). https://www.govtrack.us/congress/bills/115/hr3393
[300] Next Generation American Manufacturing Act of 2017, H.R. 340, 115th Cong. (2017). https://www.govtrack.us/congress/bills/115/hr340
[301] Innovation Corps Act of 2017, H.R. 1576, 115th Cong. (2017). https://www.govtrack.us/congress/bills/115/hr1576
[302] FUTURE of Artificial Intelligence Act of 2017, S. 2217, 115th Cong. (2017). https://www.govtrack.us/congress/bills/115/s2217; H.R. 3411, 115th Cong. (2017); "To establish in the National Highway Traffic Safety Administration an Automated Driving System Cybersecurity Advisory Council to make recommendations regarding cybersecurity for the testing, deployment, and updating of automated driving." systems. https://www.govtrack.us/congress/bills/115/hr3411; H.R. 3416, 115th Cong. (2017); "To establish in the National Highway Traffic Safety Administration a Rural and Mountainous Advisory Council to make recommendations regarding the testing and deployment of highly automated vehicles and automated driving systems in areas that are rural, remote, mountainous, insular, or unmapped." https://www.govtrack.us/congress/bills/115/hr3416

Existing legislation might undergo further reforms and changes (e.g., see the trend in **France**). As highlighted in the **USA** report, legislators are and will make greater efforts to clarify how AI and robotics technologies will relate to existing laws. In many cases existing legal arrangements may be seen to suffice to deal with many of the issues raised by AI and robotics. In **Poland**, some legal practitioners and legal scholars have expressed their concern regarding the development of AI and robotics and highlighted the need to develop specific, unified definitions of AI and robotics; they suggest legal systems will have to decide on the limits of robotics autonomy and how to effectively control compliance with the designated boundaries and even call for the reconstruction of fundamental principles of civil law.

6.5.3 Developments related to new regulatory bodies for AI and robotics

The national research revealed no new regulatory bodies[303] have been created specifically to regulate AI or robotics at this level, though there have been suggestions and calls, for example, in the **Netherlands** for a national algorithm watchdog and in the **USA**, for a Federal Robotics Commission. In China, the State Council's *Development Plan for New Generation of Artificial Intelligence*[304] called for the establishment and improvement of an open and transparent AI regulatory system, and implementation "of a double-layer regulatory structure that places equal emphasis on design accountability and application supervision, and realize full process supervision of AI algorithm design, product development and achievements application".[305]

The primary type of body identified is the regulatory or policy guidance or advisory body. For example, the **German** Study Commission at the German Bundestag "Artificial Intelligence – Social Responsibility and Economic Potential and the German Data Ethics Commission[306]; the **Greek** Working Group for the drafting of a National Strategy for Intelligent Transport Systems, offers guidance to regulators on intelligent transport systems. **Sweden** created the Agency for Digital Government in 2018 (responsible for issues of digitalization in the Swedish public sector). The Centre for Data Ethics and Innovation (CDEI) is now in operation in the **UK** as a government advisory body to investigate and advise on how the benefits of data-enabled technologies, including AI can be maximised and to identify measures needed to strengthen and improve the way data and AI are used; promote best practice and advise on how Government should address potential gaps in the regulatory landscape. In the **USA,** the National Science and Technology Council's Subcommittee on Machine Learning and Artificial Intelligence (MLAI) was established in 2016 to advise the President on policy relating to AI.

[303] Bodies that exercise regulatory or supervisory powers. E.g., regulatory agencies, AI watchdogs, Robotics Commissions.

[304]The State Council of the People's Republic of China, "Development Plan for New Generation of Artificial Intelligence", 20 July 2017. http://www.gov.cn/zhengce/content/2017-07/20/content_5211996.htm

[305]Ibid.

[306] Its task is to "develop ethical standards and guidelines for the protection of individuals, the preservation of social cohesion and the safeguarding and promotion of prosperity in the information age. The Commission is also tasked with providing the Federal Government with recommendations and regulatory proposals on how ethical guidelines can be developed, respected, implemented and monitored." See https://www.bmi.bund.de/SharedDocs/downloads/EN/themen/it-digital-policy/key-questions-Data-Ethics-commission.pdf;jsessionid=D6EE62EF218E0589ABD8E7095F36BFDA.1_cid373?__blob=publicationFile&v=6

There are also non-governmental, non-regulatory bodies being set up to promote public debate on legal implications from wide use of AI systems – however, these are influential in providing policy-making guidance and legislative lobbying (e.g., **Brazil**).

In other countries such as **Poland, South Africa,** and **Spain**, no developments were reported.

One argument advanced against new regulatory bodies for AI and/or robotics is that existing regulatory bodies could adequately cover with the help of new regulations any new challenges posed by AI and/or robotics. Another argument against creating new regulatory bodies is that they might contribute to the reactiveness of policy. A key challenge with any new bodies that might be set up would be to ensure that they are useful, fill a gap or fulfil a need (alleviate the pressure on already burdened data protection authorities, for example), have clear roles and remits and do not overlap or conflict with pre-existing bodies.

6.5.4 Significant case law or judgments addressing human rights challenges of AI and robotics

In many cases, even using a variety of search terms but primarily 'AI' and 'robots', researchers were not able to identify (e.g., **Brazil, South Africa, Spain**) or found it difficult to identify significant cases/judgments addressing human rights challenges of AI and robotics using desktop research or requests for information (e.g., **China, Poland**) especially in the highest law courts. Case law identified focussed on following aspects outlined in the table below:

AI	Robotics
insufficiency of consent provided to a law enforcement officer through Google Translate to meet constitutional requirements for search **(USA)**	accidents related to industrial robots (e.g., inadequate robot safety causing death of worker) **(UK, Sweden)**
electronic surveillance **(UK)**	alleged dysfunction of a factory using robots to make beer (**Greece**)[307]
liability related to automated search engines services, web crawlers, gaming bots (**France, UK, Sweden**)	damages for the destruction of goods (**Greece, UK**)
obligatory use in certain administrative decisions of automated decision-making and the fundamental principle of equality of arms in the judicial procedure (Netherlands)	death caused by self-driving cars (**China**)
use of algorithms in decision-making in employment promotion and labour market institutions (**Poland**)	harms caused due to/liability for injuries from robot assisted medical procedures/surgery (**Germany, Greece, USA**)
use of algorithmic scoring in the evaluation of public school teachers for determination of annual performance bonuses (**USA**)	law enforcement liability for injuries sustained when police used a robot to remotely detonate a bomb at plaintiff's front door (**USA**)

[307] No liability found for the beer producer.

AI	Robotics
use of high-frequency trading algorithms to commit commodities fraud, market manipulations (**USA, Sweden**)	recognition that a robot-made digging of the earth as part of a larger construction project consists a 'work' and not 'services' under the law[308] (**Greece**)
use of predictive algorithms throughout the criminal justice system (algorithmic risk assessment tools in criminal sentencing) (USA)	security of employees working with automated systems and responsibility of the employers in for breaches of the legislation relating to the security of workers in the use of robots (**France**)
use of predictive analytics to identify potential targets for military strikes (**USA**)	

Table 7: AI and robotics issues addressed in national case law

6.5.5 Other relevant, potential future national legal developments

The national reports also explored and where found, identified potential future legal developments relating to AI and robotics from authoritative national legal sources. These are summarised below.

- Consideration and further development of AI ethical norms, policies and regulations to address the risks and challenges of AI and robotics (**most analysed countries**)
- Increasing consideration and use of robotization and use of AI in the judicial system (**Brazil, Netherlands**)
- Suggestion to include 'personal data' in the preamble of the French Constitution and creation of collective data rights, soon to be taken stance on right of dereferencing (droit de déréférencement) (**France**)
- Review and revisions of the regulatory framework to ensure further legal certainty based on Data Ethics Commission proposals; promotion of the development of innovative applications which bolster self-determination, social inclusion and privacy of citizens (**Germany**)
- Social and policy dialogues on the impacts of technological developments on the labour market; Council of State unsolicited advice that calls attention to issues of automated decision-making, transparency (about algorithms used) and privacy (**Netherlands**)
- Potentially new developments influenced by EU Committee on Legal Affairs report with recommendations to the Commission on Civil Law Rules on Robotics; four groups are working on addressing the challenges related to AI and robotics (**Poland**)
- Some movement with regard to non-legislative motions in connection to the use of AI in specific fields such as labour market or medicine, but not as a whole vision of AI or robotics (**Spain**)
- Tackling of relevant issues including market abuse and algorithmic trading, gaps in law (**Sweden**)
- Creation of regulatory (advisory) bodies and other oversight mechanisms for monitoring and innovation management; sharing of best practice between bodies (**UK**)
- Creation and revision of an evolving framework for regulation to enable the safe integration of fully automated vehicles and UAS, including novel vehicle designs, into the transportation system (though there is evidence of voluntary approach to regulation); recommendation to

[308] Services necessitate a person and therefore granting remuneration for a work produced (and not services rendered, which are subject to different tax etc).

complete the development of a single, governmentwide policy, consistent with international humanitarian law, on autonomous and semi-autonomous weapons; need identified for further research into computational ethics and explainable AI; establishment of regulatory sandboxes. (**USA**)

For some countries such as **Greece**, there are no other significant developments expected in the near future based on lack of policy-making evidence in AI and robotics or due to the underdevelopment of such technologies. **South Africa** is in a similar position.

6.5.6 Additional information

Some additional information that came to light in the national research is outlined here. This part draws out any information not already captured in the previous sections and that researchers thought was relevant to highlight in relation to their country.

For **Brazil,** one key issue identified is how the widespread use of AI in the Brazilian legal system might possibly lead to an increase in the number of judicial disputes and might defeat the purpose of deploying AI systems.

Chinese legal experts and scholars have suggested that **China** should draw on the experience of foreign countries such as EU countries, base itself on local development, and introduce the national development strategy as soon as possible and special legislation on robotics in due time. There are also calls to strengthen the protection of intellectual property in the field of AI.

Greece might potentially see legal (legislative) developments in the distant future in relation to AI enabled automated vehicles.

Outside of the realm of case law, legislation, and regulation, the private sector has significant influence in the **USA.** In the absence of strong federal law addressing AI and robotics, industry standards and guidelines may serve a key role in dictating how these technologies develop. Given the nature of the U.S. technology industry, new policies and practices from a single dominant company may also play a part in developing nationwide standards for AI and robotics.

6.6 Comparative analysis of specific legal questions based on the national reports

This section presents the comparative analysis of the four specific legal questions addressed and reported in the national reports. We identify the convergences and the divergences along with any peculiarities.

6.6.1 Comparative analysis of specific legal questions: AI

For AI, first we compare how the national law deals with algorithmic bias and discrimination and second, we cover how the law addresses intellectual property issues related to works created by AI. For detailed analysis of each issue in a country, please refer to the individual country reports.

Algorithmic bias and discrimination

Algorithmic bias and discrimination are prohibited under existing laws and regulations in all the countries studied (though such laws and regulations might not mention 'AI' or 'algorithms' 'algorithmic bias' specifically). In the EU Member States, the GDPR is in force and given its provisions and safeguards in relation to automated decision-making including those based on profiling (which would have the potential to create discriminatory effects), that have a legal or similarly significant effect on individuals). Algorithmic bias as discrimination risks are seen as being better addressed but there may be some peculiarities and specificities (see, e.g., **France** report).

Algorithmic bias and discrimination issues might also be covered under the purview of general IT law and/or be covered under constitutional law provisions (e.g., privacy rights, equality rights, and other procedural rights). E.g., In **Greece**, the equality provision in the Constitution would be relevant. Bias and discrimination would fall within the purview of the Law 3769/2010 on the application of the principle of equal access to goods and services. In the **Netherlands**, there are no dedicated legislative rules that specifically address the potential impacts of AI on the fundamental right to equal treatment and non-discrimination'; consequently, issues of algorithmic bias and discrimination fall within the realm of general constitutional (privacy rights, equality rights, procedural rights) and general administrative law (particularly in the context of the use of AI by government executive bodies). The **Polish** Constitution[309] prohibits discrimination in political, social or economic life for any reason whatsoever (Art. 32). Issues regarding discrimination are regulated by the Act on the implementation of some regulations of European Union regarding equal treatment (Anti-discrimination Act).[310] In **Spain,** algorithmic bias and discrimination could impact fundamental constitutional rights (right to personal dignity, inviolability of rights and free human development; right to equality; non-discrimination; privacy), penal code protections, provisions of the national Organic Law from 2007[311] about effective equality between men and women; Autonomous Communities Acts and local legislation prohibiting various forms of discrimination.

In **Sweden,** the Administrative Procedure Act permits the use of automated decision-making.[312] Protection against discrimination is a constitutional guarantee enshrined in Chapter 2, Articles 13 and 14 of the Instrument of Government.[313] Further to these human rights guarantees, the key national act that seeks to combat discrimination and promote equal rights and opportunities is the Discrimination Act.[314] There are also other national laws that relate to the question of discrimination,

[309] Poland, Konstytucja Rzeczypospolitej Polski (The Constitution of the Republic of Poland), 2 April 1997
[310] Poland, Ustawa o wdrożeniu niektórych przepisów Unii Europejskiej w zakresie równego traktowania, (Act on the implementation of some regulations of European Union regarding equal treatment), 3 December 2010
[311] Spain, Ley Orgánica 3/2007 para la igualdad efectiva de mujeres y hombres (Organic Act for the effective equality of women and men), 22 March 2007. https://www.boe.es/buscar/pdf/2007/BOE-A-2007-6115-consolidado.pdf
[312] Administrative Procedure Act, op. cit., Section 28. The act contains provisions on communication and the right to provide information orally, the right to review and the right to appeal. Furthermore, it also sets forth the general requirements for legality, objectivity and proportionality. Hence, it has been argued that the national legal framework sets forth sufficient safeguards for the data subjects.
[313] The question of discrimination is also addressed as part of Sweden's external commitments (for example, UN (specifically, ICCPR), CoE (specifically, ECHR), as well as the EU (specifically, TFEU, CFREU, Equal Treatment Directive, and GDPR).
[314] Prior to the enactment of the Swedish Discrimination Act, seven different laws aimed at combatting discrimination existed in Sweden. However, on the 1st of January 2009 the current Swedish Discrimination Act

for example criminal sanctions in the prohibition on discrimination in the Swedish Penal Code (1962:700),[315] and in the context of employment the Work Environment Act.[316] The Government has taken up an initiative to strengthen the enforcement of discrimination prohibitions, and further information can be expected in autumn 2019.[317]

In the **UK**, algorithmic bias and discrimination would fall within the scope of the Equality Act 2010[318] even though the Act itself does not mention algorithms. Section 29 of the Equality Act has been stated to be particularly relevant to the AI context.[319] Algorithmic bias and discrimination might also violate the Human Rights Act 1998[320] if it affects the enjoyment of one or more rights guaranteed by the Act (e.g., Article 14). The GDPR[321] and the Data Protection Act 2018 contains (albeit indirectly) safeguards against automated decisions, including those based on profiling that have a legal or similarly significant effect on individuals.

In **Brazil**, issues of unfair discrimination might fall under the purview of, e.g., the "Consumer Protection Code" (*Port.: Código de Defesa do Consumidor*, Law Nº 8.078, from 11 September 1990.)[322]; the "Positive Registration Law" (*Port.: Lei do Cadastro Positivo*, Law Nº 12.414, from 9 June 2011)[323]; the "Law on Access to Information" (*Port.: Lei de Acesso à Informação*, Law Nº 12.527, from 18 November 2011)[324]; the "Brazilian Civil Rights Framework for the Internet" (*Port.: Marco Civil da Internet*, Law Nº 12.965, from 23 April 2014)[325] and the "Data Protection Law" (*Port.: Lei Geral de Proteção de Dados Pessoais,* Law No. 13.709, or *LGPDP*).

entered into force and replaced the previous laws. Today, the Discrimination Act is the key act on discrimination in Sweden. See Sweden, Diskrimineringslag (2008:567) (Discrimination Act).

[315] See Sweden, Brottsbalk (1962:700) (Penal Code), Chapter 16, Section 9.

[316] See Sweden, Arbetsmiljölag (1977:1160) (Work Environment Act).

[317] Kommittédirektiv 2018:99, En effektiv och ändamålsenlig tillsyn över diskrimineringslagen. Discrimination Act, op.cit.

[318] Derived from obligations under European Union law.

[319] Bickerstaff, Roger, "Does your machine mind? Ethics and potential bias in the law of algorithms", *Digitalbusiness.law,* 19 June 2017.
http://digitalbusiness.law/2017/06/does-your-machine-mind-ethics-and-potential-bias-in-the-law-of-algorithms/#page=1

[320] The UK Human Rights Act 1998 gives further effect to rights and freedoms guaranteed under the European Convention on Human Rights.

[321] Note, that the GDPR forms part of the data protection regime in the UK, along with the new Data Protection Act 2018 (DPA 2018). Both are in effect from 25 May 2018.

[322] Brasil (Presidência da República), Law No. 8.078, 11 September 1990.
http://www.planalto.gov.br/ccivil_03/Leis/L8078.htm

[323] Brasil (Presidência da República), Law No. 12.414, 9 June 2011.
http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2011/lei/L12414.htm

[324] Brasil (Presidência da República), Law No. 12.527, 18 November 2011.
http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2011/lei/l12527.htm

[325] Brasil (Presidência da República), Law 12.965, 23 April 2014.
http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2014/lei/l12965.htm

In **China,** issues such as algorithmic bias and discrimination might be addressed by constitutional (right to equality), civil (citizens' rights), consumer law[326], the anti-monopoly law,[327]e-commerce law (which confirms the obligations of operators and platform operators engaged in e-commerce activities.[328]

South Africa has got extensive legislation and case law protecting against discrimination and algorithmic bias, seen as a form of discrimination, would likely fall within the purview of three South African statutes: the Promotion of Equality and Prevention of Unfair Discrimination Act (PEPUDA),[329] the Employment Equity Act (EEA)[330] and the Protection of Personal Information Act (PoPI Act).[331]

Bias in algorithmic decision-making is well-documented[332] in the **USA**, but there are relatively few legal protections in place to combat its effects. While the legislature may intervene, creating laws to prohibit the use of certain demographic factors tied to protected classes or to ensure that AI systems do not produce dissimilar results according to characteristics such as race, few such laws currently exist. One exception to this is in the realm of credit and insurance scoring, where more robust statutory protections exist to prevent the use of protected demographic characteristics in algorithmic decision-making.[333] However, these protections are limited, and the overall lack of transparency and oversight in credit scoring continues to produce arbitrary, if not biased, results.[334]

In some of the national research, gaps were identified, e.g., there are few robot and algorithm- specific laws, and such protections are limited in nature. In some cases, no gaps were identified. This is not unusual given the state of play of use and implementation of AI which varies across countries and even within countries and the lack of such issues being brought/having been presented in court. The issue is whether there is a clear-cut need to specifically further address AI-based/facilitated bias and discrimination. As the reports show, in some countries there is a clear difference between how this is handled in the public and private sector. Under public administration law, bias and discrimination might already be well-handled, but in the private sector this is more of an issue. For the EU countries, the GDPR might provide a good baseline and safeguards in relation to automated decision-making but it still has a limited scope; its protections might not be effective in protecting the wide range of fundamental rights where AI has effects outside its scope. But this does not mean national legislatures need to take hasty steps for the sake of legislating without carrying out an in-depth regulatory analysis.[335]

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[326] See *Law of the People's Republic of China on Safeguarding the Rights and Interests of Consumers.*

[327] The People's Republic of China, 《中华人民共和国反垄断法》(Anti-monopoly Law of the People's Republic of China), 30 August 2007.

[328] The People's Republic of China, 《中华人民共和国电子商务法》(E-Commerce Law of the People's Republic of China), 31 August 2018.

[329] South Africa, Promotion of Equality and Prevention of Unfair Discrimination Act (PEPUDA) Act 4 of 2000

[330] South Africa, Employment Equity Act (EEA), Act 55 of 1998.

[331] South Africa, Protection of Personal Information Act (PoPI Act), Act 4 of 2013.

[332] Barocas, Solon and Andrew D. Selbst, "Big Data's Disparate Impact", California Law Review, Vol. 104, Issue 3, pp. 671-732, 2016. http://www.californialawreview.org/wp-content/uploads/2016/06/2Barocas-Selbst.pdf ; Angwin, Julia, Jeff Larson, Surya Mattu, and Lauren Kirchner, "Machine Bias", ProPublica, May 23, 2016. https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing

[333] 12 C.F.R. § 202.5 (2013).

[334] Citron, Danielle Keats and Frank Pasquale, "The Scored Society: Due Process for Automated Predictions", *Washington Law Review*, Vol. 89, 2014, pp. 10-18. https://digital.lib.washington.edu/dspace-law/handle/1773.1/1318

[335] This could be supported by a general technology-level human rights and ethical impact assessments and analysing whether current self-regulatory tools and measures work.

Intellectual property issues related to works created by AI

This section illustrates how the countries studied address intellectual property issues related to works created by AI. It presents relevant examples from the national reports.

In the current state of intellectual property law in **France**, the recognition of an AI as fully responsible for a particular creation does not exist and only human beings can benefit from the intellectual property regime.[336] Three solutions have been proffered to regulate the intellectual property of products developed from AI: contractual,[337] the solution that follows the logic of 'offspring' or 'fruits'[338], and the patent law solution.[339] The position is similar in **Germany**, i.e., an AI cannot enjoy intellectual property rights, only natural persons can. In **Greece**, copyright law too, does not protect any work in which there is no natural person as an author; further, no patent can also be granted to a computer-generated invention (Law 1733/1987 Art., 6 par. 1, under which the right to a patent may be granted to the inventor or the beneficiary). Only the creator of a design may claim design rights under Greek law (Law 2417/1996). As an AI system cannot hold any type of property in Greece, trademark protection with an AI system as a beneficiary in Greece is not possible. In the **Netherlands**, in the first instance, and from the moment a work is made, and without further formalities, the maker or author, by definition a natural person (and not a legal person), holds the copyright.[340] While the maker or author can only be a natural person, Dutch copyright law is clear on the fact that a copyright can held by a natural person, who created the work or his/her successor, but also by a legal person. From the Supreme Court ruling in the Van Dale/Romme case, Spoor, Verkade and Visser conclude that that to meet the minimum requirement of originality for copyright protection, personal human interference and originality needs to be expressed in and reflected by the work.[341] At the moment no significant indications nor initiatives exist towards changing this basic interpretation in Dutch copyright law and so application of AI is not currently expected to bring major changes in copyright law in the Netherlands.

In **Poland**, only a human being can be considered the "author" of an intellectual property work; under existing law, AI cannot be granted the status of an "author" (due to an indirect bond between the AI's work and its owner or programmer, there are no indicators that they, i.e., the owners or programmers could be regarded as the "author" of the work). Copyright laws do not protect the work created by the

[336] De Ganay, Claude de and Dominique Gillot, "Report by the Parliamentary Office for the Evaluation of Scientific and Technological Choices. Toward a Controlled, Useful and Demystified Artificial Intelligence", 2017, pp. 145–46; Alexandra Bensamoun, "Création et Données: Différence de Notions = Différence de Régime?", *Dalloz IP/IT*, 2018, p. 85.

[337] De Ganay and Gillot, op. cit.,, 2017, pp. 145–46.

[338] It is nonetheless important to recognise recent legal developments in relation to animals' rights in French law. A new article of the Civil Code (art. 515-14) recognises them as "living and sentient beings". Though this development may be perceived as opening a breach toward the recognition of a legal personality to animals, this is not yet the case in the current state of French law today. See for instance: https://univ-droit.fr/la-gazette-juridique/18288-un-statut-de-l-animal-dans-le-code-civil

[339] Larrieu, Jacques, "Robot et Propriété Intellectuelle", *Dalloz IP/IT*, 2016, p. 291.

[340] Hornman, Fenna, *A robot's right to copyright.* Master thesis Tilburg University, the Netherlands, 2018. http://arno.uvt.nl/show.cgi?fid=145318

[341] Spoor, M. J., M. Verkade, and M. Visser, *Recht en Praktijk, Auteursrecht: Auteursrecht, naburige rechten en databankenrecht*, Vol. 42, 2005. Alphen aan den Rijn: Kluwer, p. 73. In her earlier cited master's thesis, Hornman takes distance from this position, stating that it does not follow from this that the author needs to be human. Op.cit, 2018, p 13.

AI, which includes, *inter alia*, artistic creations such music or paintings. Polish law, in its current state, also does not specify to whom infringement liability could be attributed since 'AI' cannot be considered a person. Thus, an algorithm cannot be held liable for copyright infringements.

In **Spain** too, the law does not ascribe intellectual property rights for AI generated works or inventions to AI or machines. Although, the creator of the work could be a machine or an AI, the two rights, personal right and patrimonial right of intellectual property are only attributable/available to human creators or legal entities, legal figures who are recognised by law to have rights.

While discourse relating specifically to AI and copyright is scarce in **Sweden**, but as highlighted by Olsson and Rosén,[342] AI cannot be regarded as the author under applicable Swedish copyright law (as the Copyright Act exclusively applies to physical persons).[343] The same generally applies to the question of inventorship under Swedish patent law, which raises analogous legal issues.

The legal protection of AI inventions raises analogous issues (grounded in the same vein) as those discussed in the context of copyright protection.

In a departure from the above, **UK** law protects computer-generated works[344]; the author is taken to be the person by whom the arrangements necessary for the creation of the work are undertaken."[345] English courts have been more ready than other jurisdictions to find AI-related inventions non-patentable.[346] The creator of the AI design owns such rights except if the work was commissioned or created during the course of employment. In this latter case, the rights belong to the employer or party that commissioned the AI work.[347] Since it is in the nature of a property right, and a registered trade mark is personal property (in Scotland, incorporeal moveable property), unless an AI system was able to hold/have personal property, this right might not apply or be able to be enjoyed by the AI system.

In **Brazil,** the law[348] does not address issues related to works created by AI; this issue, and the issue related to the authorship of works written by AI systems, has been discussed thus far by Brazilian legal scholars and philosophers rather than legislators or policymakers.[349] Brazil follows the 'natural person

[342] Olsson, Henry, and Rosén, Jan "Upphovsrättslagstiftningen – en kommentar" 4th edn, Wolters Kluwer, Stockholm, 2016, p. 63.
[343] Unlike the British CDPA 1988, the Swedish Copyright Act does not contain express provisions relating to authorship of, and subsistence of rights in, so-called computer-generated works (cf. ss. 9(3), 79(2)(c) and 81(2) CDPA 1988)
[344] Work […] generated by computer in circumstances such that there is no human author of the work. Section 9(3) of the Copyright, Designs and Patents Act (CDPA) expressly lays down the position that "[i]n the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken.
[345] https://www.legislation.gov.uk/ukpga/1988/48/contents. Authorship of computer-generated works was considered in *Nova Productions Ltd v Mazooma Games Ltd & Ors* (CA) [2007] EWCA Civ 219 and *Bamgboye v Reed & Others* [2002] EWHC 2922 (QB).
[346] Stephens, Katharine and Toby Bond, "Artificial intelligence: Navigating the IP challenges", *PLC Magazine*, July 2018, pp. 39-45. [p. 42]. https://www.twobirds.com/~/media/pdfs/ai--navigating-the-ip-challenges-plc-magazine-june-2018.pdf?la=en
[347] https://www.copyrightservice.co.uk/protect/p15_design_rights
[348] Brasil (Presidência da República), Law No. 9.279, 14 May 1996 http://www.planalto.gov.br/ccivil_03/Leis/L9279.htm.
[349] Magrani, Eduardo, *A internet das coisas*, FGV Editora, Rio de Janeiro, 2018.

as author regime', though a natural person could be commissioned by a legal person[350] to produce a new work, in which case the author may be the legal or natural person, according to what has been established in contract between the legal and the natural person.[351]

In **China**, there are no clear legal provisions regarding the patentability of works created by AI, but some believe that they should be eligible for patent protection.[352] As per the Copyright Law, the subject of copyright is a natural person, legal person or other organisation, and copyright subject status cannot be discussed without a "human", so AI may be an author, but the ownership of copyright would rest with a human (as AI cannot exercise rights like natural authors or legal authors. In other words, the copyright belongs to the creators or owners of AI-generated works).

In **South Africa,** where an AI produces a work that satisfies the requirements outlined in law, the work will be classified as computer-generated. Authorship is attributed to the 'person by whom the arrangements necessary for the creation of the work were undertaken".[353]

In large part, the ownership of works created by AI has not been addressed in **U.S.** law. In American copyright law, "human authorship" is required in order to copyright a work,[354] meaning works created by AI systems are ineligible for copyright protections. American patent law lacks this explicit human authorship requirement, but an invention must be the result of a "mental act"[355] and must have a named "individual" inventor in order to be patentable.[356] These requirements would seem to preclude patentability for AI-generated inventions, though it may be possible to circumvent these requirements by registering a human as the "discoverer" of a computer's invention.[357]

Thus, by and large the ownership of IP in created by AI still largely vests in humans or natural persons. This field is yet to fully develop and will depend on the legal status given (or not) to AI systems. Given advances in AI, will traditional limited interpretations of intellectual property law concepts remain pertinent when tackling new issues that will come to the fore as AI generates more intellectual property and/or starts self-commissioning works with or without humans in the loop? How will innovation be truly protected and if IP rights are extended to non-human entities, how will it affect humans? These are pertinent questions for further research. These are important to address because

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Araujo, Marcelo de. "O uso de inteligência artificial para a geração automatizada de textos acadêmicos: plágio ou meta-autoria?" *Logeion: Filosofia da* Informação, Vol. 3, No. 1, 2016, p. 89-107.

[350] E.g., e.g., a TV studio for instance.

[351] The relevant legislation pieces of legislation are: Law N. 9.610/98 (LEI Nº 9.610, 19 February 1998, also known as "Copyright Law" Port. Lei ded Direitos Autorais.) http://www.planalto.gov.br/Ccivil_03/leis/L9610.htm; Law N. 9.609 (LEI Nº 9.609, 19 February 1998, also known as "Software Law" Port. Lei do Software, or Lei do Programa de Computador). http://www.planalto.gov.br/ccivil_03/leis/l9609.htm; Law N. 9.279 (LEI Nº 9.279, 14 May 1996, also known as Patent Law, Port. Lei de Propriedade Industrial). http://www.planalto.gov.br/ccivil_03/Leis/L9279.htm

[352] Wu, Handong, Zhang Ping and Zhang Xiaojin, "AI's challenges to the legal protection of intellectual property rights", *China Law Review*, Vol. 20, 2, 2018, pp. 1-24

[353] South Africa, Supreme Court of Appeal, *Haupt t/a Softcopy v Brewers Marketing Intelligence (Pty) Ltd* 2006 (4) SA 458

[354] U.S. Copyright Office, *Compendium of U.S. Copyright Office Practices* § 313.2 (3d ed. 2017).

[355] *Townsend v. Smith*, 36 F.2d 292, 295 (Cust. & Pat. App. 1929).

[356] 35 U.S.C.A. § 100(f).

[357] Abbott, Ryan, "I Think, Therefore I Invent: Creative Computers and the Future of Patent Law", *Boston College Law Review*, Vol. 57, Issue 4, 2016, pp. 1098. https://lawdigitalcommons.bc.edu/bclr/vol57/iss4/2/

as Stephens and Bond point out, the "creation, protection and exploitation of IP" is "a key plank to improving competitiveness" [358] whether at regional or national level.

6.6.2 Comparative analysis of specific legal questions: robotics

For robotics, we first compare how countries address the creation of a specific legal status for robots or legal personhood or electronic personality. This is followed by a look at how safety and civil liability issues for damage caused by robots are addressed.

Creation of specific legal status for robots

The national studies show most of the analysed European and non-EU countries have not addressed the issue of creation of a specific legal status for robots at the policy-making or legislative level; rather this is presented in legal academic and media-led discussions which present arguments both in favour and against granting robots a specific legal status or rights. No country has so far explicitly awarded 'robots' a specific legal status, in some cases robots could be interpreted as 'things' since they are not persons.[359] The research below indicates some general positions and directions these could take in the future.

In **France**, this is a key issue in the French debate related to the legal regulation of robots – as well as AI, with lawyer Alain Bensoussan[360] being one of the most vocal proponents of the creation of a specific legal status for robots[361], though other influential experts oppose this position.[362]

In **Germany,** the question if robots or other autonomous digital systems should have rights and obligations or a legal status is discussed more in the media (vis a vis robot rights) than academia[363] with a focus more on international law, EU developments and ethical and legal issues in general and not national law. The country report states the leading academic opinion seems to be that robots should have no legal status, since they are not persons and therefore neither liable nor have any rights.[364]

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[358] Stephens, Katharine and Toby Bond, "Artificial intelligence: Navigating the IP challenges", *PLC Magazine*, July 2018, pp. 39-45. https://www.twobirds.com/~/media/pdfs/ai--navigating-the-ip-challenges-plc-magazine-june-2018.pdf?la=en

[359] E.g, France, Greece, Poland reports.

[360] An influential lawyer in France, a practitioner who publishes in academic journals. See https://www.alain-bensoussan.com

[361] See for instance his 2015 TEDx talk in Paris, "De l'urgence des droits des robots?", accessible online at: https://www.youtube.com/watch?v=3qkjEeV3Sno

[362] Bensamoun, Alexandra, and Grégoire Loiseau, "L'intégration de l'intelligence Artificielle Dans l'ordre Juridique En Droit Commun: Questions de Temps", Dalloz IP/IT, 2017, p. 239. Gautier, P.-Y., "De la propriété des créations issues de l'intelligence artificielle", *La Semaine Juridique*, vol. 37, p. 913, 2018.

[363] See e.g., https://www.n-tv.de/wissen/Roboter-Recht-bringt-Juristen-ins-Gruebeln-article20491016.html; https://www.lto.de/recht/legal-tech/l/digitalisierung-rechte-fuer-roboter-elektronische-person-rechtspersoenlichkeit/; https://www.deutscheranwaltspiegel.de/haben-roboter-rechte/; https://www.zeit.de/2016/40/legal-tech-algorithmen-juristen-ersatz.

[364] See Beck, S., "Brauchen wir ein Roboterrecht? Ausgewählte juristische Fragen zum Zusammenleben von Menschen und Robotern" (English translation: Do we need laws for robots?) in: Japanisch-Deutsches Zentrum (ed.), *Mensch-Roboter-Interaktionen aus interkultureller Perspektive*, Berlin, 2012, p.135. https://www.jdzb.de/fileadmin/Redaktion/PDF/veroeffentlichungen/tagungsbaende/D62/11%20p1338%20beck.pdf

There is no **Greek** law specifically dealing with robots. Under current civil law, robots can be interpreted as 'things'.[365] Robots cannot have any legal personality and cannot be the subjects of rights or interests, as these require either a natural or legal personality.[366] Robots can also be products, and as such, they may give rise to product liability for their producer (Law 2251/1994, Art. 6). On the possibility of a legal contract where a robot is a contracting party, as an autonomous agent, there is some feeble discussion in the legal theory.[367] The discussion on offering a particular legal status for robots in Greece has not reached any important dimension.[368]

In the **Netherlands**, no notable steps have been taken to introduce a separate legal status for robots, legal personhood or electronic legal personality into Dutch law. This suggests, as some have argued that existing civil law arrangements are felt to suffice also in respect of robotics and AI in dealing with, particularly, liability issues, but also with issues of (intellectual) property, the performance of legal acts.

In **Poland**, robots cannot obtain legal personality nor the capacity to have rights or obligations. Robots are treated as a product and are granted a status of 'things'.

In **Spain**, there has been no development in this respect; the research carried out only highlighted discussion on the necessity of a robot law in two aspects: how robots will be regulated in their duties and how should be the legal robots and AI will replace humans in the work space.[369] Scholars have underscored the need for constitutional boundaries in the use of robots, especially regarding the possibility of killing persons.[370]

At the moment, robots have no special legal status or legal personality in **Swedish** law, regardless of how advanced or intelligent they are. A robot would rather be considered moveable property (chattel personal) in the Swedish legal order.[371] At the time of writing, there was no discussion on granting

[365] Things are impersonal objects capable of being exploited by man, (Greek Civil Code Art. 947).
[366] Greek Civil Law Code Art. 61 onwards.
[367] George, Georgiades, *Contracting in the Internet,* Sakkoulas, Athens-Thessaloniki, 2003 (who does not accept this possibility) and Ktistakis S., 'Artificial Intelligence and Contractual Procedure', *Applications of Civil Law and Civil Procedure*, vol. 4, 2018, p. 605. See also, generally, Eidenmueller, H., "The Rise of Robots and the Law of Humans", Oxford Legal Studies Research Paper No. 27/2017, 26 March 2017. Available at SSRN: https://ssrn.com/abstract=2941001 or http://dx.doi.org/10.2139/ssrn.2941001.
[368] Ballas and Konstandakopoulos, op.cit., note that '...Robots could possibly be recognized under the same dual status (as corporations, as property and as legal persons) serving and balancing different legal needs...it is noted that the possession of a right does not require the physical ability to assert and exercise if. If legal personhood is attributed to robots, the user would possibly be the representative, the 'legal guardian', bringing their claims before justice...consciousness and self-awareness ..is not a *conditio qua non* for legal personhood..', p. 145, citing non-Greek authors and commentators.
[369] Barrio Ándres, Moisés, "Del derecho de internet al derecho de los robots", Moíses Barrio Ándres (ed) *Derecho de los Robots*, Wolters Kluwer, Las Rozas, 2018, pp. 61-86.
[370] Sánchez Barrilao, José F., "Derecho Constitucional, desarrollo informático e inteligencia artificial: aproximación a la propuesta del Parlamento Europeo a favor de una regulación sobre robótica", Javier Valls Prieto, *Retos jurídicos por la sociedad digital*, Navarra, Thomson Reuters Aranzadi, 2018, pp. 21-76.
[371] In Sweden there is no codified legal definition of moveable property. Instead, the definition of moveable property is negative and can be inferred by construing the provisions in Chapters 1 – 2 of the Swedish Land Code *a contrario*. See Sweden, Jordabalk (1970:994) (Land Code). From these chapters it follows that moveable property is all property that is not immoveable. For more on this, please see Regeringens proposition 1988/89:76, om ny köplag, pp. 60 – 61. See also the preparatory works to the Product Liability Act which further elaborate on movables in a narrow sense relating to physical objects that can be moved. See Sweden, Produktansvarslag (1992:18) (Product Liability Act). Regeringens proposition 1990/91:197, om Produktskadelag, p. 13. Thus, a robot

robots legal personality in Sweden. The issue has not been discussed or examined by the legislator or addressed by the courts. The national researchers did not find any current discussion in legal doctrine.

In the **UK**, robots do not have a specific legal status (though some legal commentators have suggested that "company law might furnish the functional and adaptive legal "housing" for an autonomous system" and suggest how existing laws in various jurisdictions, including the UK, might provide a potentially unexpected regulatory framework for autonomous systems. In their work, they explore some legal consequences of this possibility.[372] They suggest that there might be many practical and theoretical problems but think that "the flexibility inherent in UK corporate law develops in a manner that allows autonomous systems, as an increasingly present commercial fact, to inhabit corporate forms in a way that approximates to some form of legal personhood".[373] Some commentators such as Bryson consider conferring legal personhood on purely synthetic entities will become a very real legal possibility, but think such "legislative action would be morally unnecessary and legally troublesome".[374]

In **Brazil,** the law does not recognise a specific legal status for robots and in July 2018, the Ordem dos Advogados do Brasil (OAB), set up an internal commission to propose norms for the regulation of "robot lawyers" and AI at large in Brazil".[375] To the best of the country report authors information, the Commission has not yet proposed a solution and legal status of robots remains unregulated in the context of Brazilian law. Academic discussion on this matter in Brazil has tended to cover the current debate in countries such as UK and USA, where these technologies have already been deployed.

According to Wu[376], in **China** there are two schools on the subject qualification of robots in the legal field at present, the advocates and the opposition. The advocates believe that robots should be endowed with legal personality, and the oppositions hold that robots controlled by natural persons, legal persons and other civil subjects are not enough to achieve independent subject status. In Wu's opinion, no matter how robots bear responsibilities, the ultimate responsible bearer is human, which makes the "legal personality" of AI/robot redundant. Chen thinks that robots and AI in a wider sense do not have a subject status in the current law.

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should rightly be considered a form of moveable property in Swedish law. Please note however that Swedish law makes a distinction between two forms of moveable property. "Lös egendom", in the wider sense of the term, includes all types of moveable property, including for example stock shares. "Lösöre", which is narrower and incorporated by "lös egendom", relates to purely physical moveable objects, such as a robot or a car, i.e., chattels personal.

[372] We note, for instance, in David Runciman's *How Democracy Ends,* 2018, which argues that many of the concerns about AI (what if we can't control it, how much transparency can we have, how can the state regulate it) were previously expressed about the corporation. Regulatory approaches might be similar and could learn from the mistakes made in the regulation of the corporation.

[373] Bayern et al, op. cit., 2017.

[374] Bryson, Joanna J., Mihailis E. Diamantis, and Thomas D. Grant, "Of, for, and by the people: the legal lacuna of synthetic persons," *Artificial Intelligence and Law,* 25, 3, 2017, pp. 273-291.

[375] Ordem dos Advogados do Brasil (OAB/PR), "OAB cria coordenação para discutir regulamentação do uso de inteligência artificial", 3 July 2018. https://www.oabpr.org.br/oab-cria-coordenacao-para-discutir-regulamentacao-do-uso-de-inteligencia-artificial/; O Sul, "A OAB criou grupo para regular o uso da inteligência artificial no exercício da lei", 3 July 2018. http://www.osul.com.br/a-ordem-dos-advogados-do-brasil-criou-um-grupo-para-regulamentar-o-uso-da-inteligencia-natural-no-exercicio-do-direito/

[376] Wu Handong, Zhang Ping and Zhang Xiaojin, op. cit., 2018.

From the **South African** perspective, the ECTA defines an 'electronic agent' as 'a computer program or an electronic or other automated means used independently to initiate an action or respond to data messages or performances in whole or in part, in an automated transaction'. A robot would presumably constitute 'an electronic or other automated means'. Provided the robot is able to independently initiate an action or respond to data messages in an automated transaction, then it would constitute an electronic agent for the purposes of the ECTA. However, there is nothing in the ECTA which indicates that autonomous agents can themselves incur or impose contractual obligations and there is thus no indication that the Act affords autonomous agents' contractual capacity.

The law in the **USA** does not currently provide a specific legal status for robots, although US legal scholars have explicitly engaged with the subject at least as far back as 1992.[377] As the United States is a common law country, legislative, regulatory and jurisprudential analysis of novel technologies and fact patterns will often proceed by way of analogy[378] or arguably applicable precedent, rather than a completely *de novo* benefits analysis, although there are well-known exceptions to this pattern.[379] While some scholars have drawn on legal analyses developed in the context of considering legal personhood for animals, children, or slaves[380] when discussing possible models for legal recognition of robots, others have cautioned against extending against relying too heavily on legal frameworks developed for other contexts and technologies.[381] In the absence of the adoption of broader or categorical legal recognition, there are several areas of law in the United States that may allow for a limited recognition of agency and legal duty for robots or artificially intelligent systems (e.g., business-entity law and corporate personhood[382]; fiduciary duties and robo-advisors[383]; autonomous weapons and the laws of war;[384]intellectual property[385]).

[377] Solum, Lawrence B., "Legal personhood for artificial intelligences." *NCL Rev.* 70, 1991, p. 1231.
[378] Grant Lamond, "Precedent and Analogy in Legal Reasoning," in *The Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta, Spring 2016 (Metaphysics Research Lab, Stanford University, 2016), https://plato.stanford.edu/archives/spr2016/entries/legal-reas-prec/; See also, e.g., MacCormick, D.N., *Legal Reasoning and Legal Theory*, Oxford University Press, Oxford, 1978 (1994), pp. 152–94; Eisenberg, M., 1988, *The Nature of the Common Law*, Cambridge, Mass: Harvard University Press, pp. 83-96; Sunstein, C., 1993, 'On Analogical Reasoning', *Harvard Law Review* 106, pp. 741–91
[379] See, e.g., the concept of "Internet exceptionalism" , Wu, Tim, "Is Internet Exceptionalism Dead?," SSRN Scholarly Paper, Social Science Research Network, 28 December 2010, https://papers.ssrn.com/abstract=1752415.; Lawrence Lessig, "The Law of the Horse: What Cyberlaw Might Teach," *Harvard Law Review* 113, no. 2 (December 1999), p. 501, https://doi.org/10.2307/1342331; and Section 230 of the 1996 Communications Decency Act.
[380] Ibid., pp. 542-543; Calverley, David, "Android Science and Animal Rights, Does an Analogy Exist?", *Connection Science*, Vol. 18, Issue 4, 2006, pp. 403-417.
[381] Calo, Ryan, "Robotics and the Lessons of Cyberlaw", *California Law Review*, Vol. 103, No. 3, 2015, pp. 513-563. http://www.californialawreview.org/wp-content/uploads/2015/07/Calo_Robots-Cyberlaw.pdf (arguing that little is gained, and much is arguably lost, by pretending contemporary robots exhibit anything like intent.")
[382] Bayern, Shawn, "The Implications of Modern Business-Entity Law for the Regulation of Autonomous Systems", *Stanford Technology Law Review*, Vol. 19, 2015, pp. 93-112. https://law.stanford.edu/wp-content/uploads/2017/11/19-1-4-bayern-final_0.pdf
[383] Fein, Melanie, "Are Robo-Advisors Fiduciaries?", September 12, 2017. https://ssrn.com/abstract=3028268
[384] United States Department of Defense, Directive Number 3000.09, 12 November 2012. https://cryptome.org/dodi/dodd-3000-09.pdf
[385] Pearlman, Russ, "Recognizing Artificial Intelligence (AI) as Authors and Inventors Under U.S. Intellectual Property Law", 24 *Rich. J. L. & Tech.*, no. 2, 2018.

Safety and civil liability issues: who is liable for damage caused by robots?

With regards to the safety and civil liability issues, the national reports suggest (a) that robotics liability issues would be covered by pre-existing laws and liability regimes (even though in many cases such issues have not yet come before the courts of law) (b) there are calls for revision of old laws and/or creation of new liability law to address issues and related to robotics and new business models that will be created (c) some aspects such as self-driving cars and drone liability are better addressed than others (d) further legal developments will depend on how standards of care/guidelines for creation and operation of robotics develop (in some countries these may be more advanced than others). The issue of how liability issues are addressed might also hinge upon the status attributed to robots/robotic applications.

The country research for **France** shows that with the increasing autonomy that robots are acquiring due to technological developments, the current approach of civil liability for robots is being challenged though could be addressed with pre-existing laws and liability regimes such as those related to liability for the action of a third person: liability for attendants (art. 1384 al. 5 of the Civil code), for children (art. 1384 al. 4 of the Civil code), or for animals (art. 1385 of the Civil code).[386]Bensamoun and Loiseau point to the significance of insurance systems and the need to pay attention to the way these will evolve in relation to future technological developments in robotics. They note, "liability law has become, to a large extent, dependent upon insurance law".[387] They also particularly insist on the responsibility of the producer when there is a security flaw in the system. As part of the focus on the responsibility of producers, they want to strengthen the duty of prevention.[388] There have been other views expressed that technological developments in robotics make it necessary to bring about a new legal system to ensure civil liability.[389]

German scholarship has discussed legal framework that deals with liability issues in human-robot interaction.[390] Under the German Product Liability Act ("Produkthaftungsgesetz"), the seller or rather manufacturer is liable for the proper function of the robot. However, these provisions are not applicable to a product that is significantly changed by use and based on the user-provided information. The leading opinion in German scholarship is that the rules outlined in the Product Liability Act are not sufficient to cover legal issues concerning new robot technologies.[391]

In **Greece,** there is no specific safety and civil liability law on robots or autonomous systems in particular (but note, drones and driverless cars are specifically regulated). The regulation on drones

[386] Courtois, Georgie, "Robot et Responsabilité'" in Alexandra Bensamoun (ed.), *Les Robots. Objects Scientifiques, Objets de Droits*, Sceaux, 2016, pp. 141-49. Bensamoun also mentions the possibility to adapt this regime of responsibility to robots characterised by a certain degree of autonomy. Bensamoun, Alexandra "Des Robots et Du Droit...", *Dalloz IP/IT*, 2016, p. 281.

[387] Bensamoun, Alexandra, and Grégoire Loiseau, "L'intégration de l'intelligence Artificielle Dans l'ordre Juridique En Droit Commun: Questions de Temps", *Dalloz IP/IT*, 2017, p. 239.

[388] Bensamoun, Alexandra and Grégoire Loiseau, "La Gestion Des Risques de l'intelligence Artificielle. De l'éthique à La Responsabilité", *La Semaine Juridique*, 2017, p. 46.

[389] Bensoussan, Alain, and Jérémy Bensoussan, *Droit Des Robots*, Paris, 2015.

[390] Beck, S., "Brauchen wir ein Roboterrecht? Ausgewählte juristische Fragen zum Zusammenleben von Menschen und Robotern", Undated. https://www.jdzb.de/fileadmin/Redaktion/PDF/veroeffentlichungen/tagungsbaende/D62/11%20p1338%20beck.pdf.

[391] Cf. Hilgendorf, E., Automatisiertes Fahren und Strafrecht - der "Aschaffenburger Fall" (selfdriving cars), in: DRiZ, pp. 66-69, 2018.

does not cover liability in tort for damages. Greek legal theory also seems preoccupied with the data protection angle of the use of drones. Damage caused by a drone to a third party, therefore, will become a liability issue for the owner or pilot of the drone, under the classic liability in tort rules of the Greek Civil Code (Art. 914 onwards). New legislation will need to consider new business models, liability and data privacy issues.

There is currently no specific legal regime for civil liability for robots in the **Netherlands**; the general civil law rules apply.[392] The point of departure is that of fault liability of a human or human organisation, from negligence through recklessness, to intent. There is no move towards acknowledgement of robots (or AI) as some type of legal personality. There are specific arrangements for specific categories where a robotics application is possible, particularly motor vehicles and medical devices which include greater strictness of liability. If none of the specified regimes applies, which is less likely for robotics, but more likely in respect of AI outside of robotics, given that with AI there is not an object causing damage, then what remains is the standard liability for negligence, meaning a lack of taking sufficient precautions as a breach of duty of care. The key problem or challenge of determining or imposing liability lies in the current absence of standards of care for the creation and operation of these, particularly AI systems, so decisions would need to be taken upon a case-to-case basis using the general criterion of the 'reasonable person' or the robot would just be treated as a tool for which the owner holds strict liability.

Under **Polish** civil and criminal law[393] robots are granted the status of a "thing". Hence, their owners are responsible for their actions, but owners have limited control over autonomous robots. Therefore, proving a cause and effect relationship between damage and a robot's action might be problematic. Under Polish civil law, liability can be assigned if a sufficient causal link between an action and damage can be found. There are different types of civil liability that can be assigned to someone: strict liability[394], liability for hazardous products[395], and liability for fault in supervision.[396] Liability for hazardous products in the case of robots can be assigned to its manufacturer.

In **Spain**, civil liability resultant from robot use might be derived from contractual or non-contractual obligations. If the end user is a consumer and a robotics product is not safe, consumer safety legislation might provide a recourse of action (though this might present its own challenges).

In **Sweden,** two main laws might come into general play – i.e., Product Liability Act and the Tort Liability Act. It follows expressly from the preparatory works that in order to be liable to pay damages for damage caused by a robot, the cause of that damage must stem particularly from the safety defect (rather than the product as such), as a more extended liability rule would be too far-reaching.[397] It is therefore limited to cases where the nexus between the caused harm and the safety defect can be established. Liability under the Product Liability Act is strict and constitutes special regulation in relation to the general Torts Act.[398] The latter framework will apply in relation to the aspects

[392] Particularly those on general liability as arranged in Section 1 of Title 3 of Book 6 of the Civil Law Code (CLC), on Tortuous Acts in general (i.e., Onrechtmatige daad), Section 2, on liability for persons and things, and Section 3, of Title 3 CLC, about product liability (i.e., Produktenaansprakelijkheid).
[393] Poland, Kodeks karny (Penal Code), 6 June 1997
[394] pol. odpowiedzialność na zasadzie ryzyka
[395] pol. odpowiedzialność za produkt niebezpieczny
[396] pol. odpowiedzialność za winę w nadzorze
[397] Prop. 1990/91:197 p.87
[398] Ibid.

unregulated by the former framework, for example where harm is caused on property other than consumer property. The Tort Liability framework requires however intent or negligence.[399] The degree to which either framework will be selected in practice is a matter of circumstances, such as the type of harm or injury occurring, and litigation strategy. Where a product with integrated software, such as a computer, causes damage, the manufacturer of the computer will be liable under the Product Liability Act, even if the damage is attributable to a defect in the software. If one of the prerequisites for liability according to the Product Liability Act is not fulfilled, any claims for damages may instead be made through Tort Law.[400] However, the Tort Law does not as a default rule establish a strict liability regime.[401] On the contrary, general tort law lays down a requirement of negligence or intent if a damage upon a person or property is to be reimbursed.[402] Faulty design or lack of performance according to the specification will instead be governed by the Product Liability Act or The Sale of Goods Act, Section 67[403] and Consumer Sales Act Sections 30-31,[404] as appropriate.[405] Swedish civil law rules on liability can already accommodate liability issues related to self-driving vehicles. Thus, no proposals were made concerning civil liability.[406]

In the **UK**, there is much legal commentary on robot safety and liability issues, though sometimes these areas are seen as "legally grey" particularly in relation to ascribing liability. The example of *driverless cars* is oft-cited in examining safety and liability.[407] The Automated and Electric Vehicles Act 2018 regulates the liability of insurers of automated vehicles. Personal drone users are regulated by the Civilian Aviation Authority (CAA) Air Navigation Order 2016 and individuals have been, prosecuted for violating these provisions. Safety and liability issues also fall within the purview of consumer law and the regime of product liability.[408] The flexibility of the tort of negligence "means that it can be used by

[399] Prop. 1990/91:197 p.87

[400] However, it should be noted that it is still possible for a claimant to seek reimbursement for damages according to general tort law even if the Product Liability Act is applicable. A claimant thus has freedom to choose in this regard as the applicability of the Product Liability Act does not preclude the application of the Tort Act. See ibid., p. 76.

[401] An exception to the requirement of fault can be found in Chapter 2 Section 2 which concerns economic damages inflicted through a criminal act. In such a situation, the Tort Act prescribes a strict liability rule.

[402] Tort Act, op.cit., Chapter 2, Section 1.

[403] Sweden, Köplag (1990:931) (The Sale of Goods Act).

[404] Consumer Sales Act, op.cit.

[405] Supreme Court (Sweden), case Ö 5451-94, 20 February 1996; NJA 1996 p. 68, p. 72, noting obiter that quality defects are governed by The Sale of Goods Act and that payable damages under that Act do not incorporate damage caused to property other than the sold goods, and that components of products are excluded as these are instead covered by the Product Liability Act. For completeness it should be noted that the Consumer Sales Act does, in comparison to The Sale of Goods Act, incorporate damage to property (or upon a person) other than the sold goods (Section 31).

[406] ibid., p. 775.

[407] Out-Law.com, "Driverless car laws will lead to 'trench warfare' on liability, warns UK peer", *Out-Law.com*, 22 Feb 2018. https://www.out-law.com/en/articles/2018/february/driverless-car-laws-will-lead-to-trench-warfare-on-liability-warns-uk-peer/; Out-Law.com, "Urgent' changes in the law necessary before driverless cars can go mainstream, survey finds", *Out-Law.com*, 14 July 2016. https://www.out-law.com/en/articles/2016/july/urgent-changes-in-the-law-necessary-before-driverless-cars-can-go-mainstream-survey-finds/

[408] I.e., Consumer Rights Act 2015, supported by other Regulations. The Consumer Rights Act extends to England and Wales, Scotland and Northern Ireland (however, section 27 extends only to Scotland and Chapter 3 of this Part extends only to England and Wales).

the courts to find liability in novel contexts".[409] In the case of robots, this could apply if one could prove the existence of a duty of care,[410] (damage suffered must be foreseeable; there was proximity between the victim suffering a damage and the defendant; and that in all the circumstances it would be fair, just and reasonable to impose liability on the defendant), as well as that there was a breach of that duty which then caused damage to be suffered (a causal link).

In **Brazil,** only natural persons and legal entities are entitled to have legal personality. Legal personality is a requirement for civil liability. The relevant piece of legislation here is the Brazilian Civil Code.[411] So far, Brazilian law does not grant legal personality to robots. A robot cannot be legally responsible for its own performance or malfunctioning. Performance, in this case, will always be imputed to the robot's owners or, as the case may be, to its developers, or to the legal entity that required its development or put it on the market. Liability will ultimately depend on the terms of the contract that has been established for the robot's operation. Two examples were provided on who is liable – a new law prohibits the use of autonomous drones and establishes that the operator is legally responsible for damage caused by the drone. Otherwise, there has not been much legal or parliamentary debate on this topic in Brazil. The use of robotics in hospitals is regulated under the broader category of telemedicine and the Brazilian Federal Council of Medicine had to update its current rules, or issue new ones, so as to render the use of telemedicine in Brazil legally feasible.

China has issued a series of rules to regulate intelligent driving vehicles; it has had a lot of legal discussions on robots' safety and liability in the field of transport. Especially with the development of robotics and the extensive road test of autonomous vehicles, there are increasing legal discussions on the safety and liability of robots in academia in China. Si and Cao[412] explain that, with intelligent robots' (such as autonomous vehicles) increasing autonomy and abilities to learn and adapt, facing the anticipated liability challenges, the insufficiency and limitation of legal rules such as tort law and contract law will gradually become manifest, and the need for new legal rules will become more and more urgent. They suggest that strict liability, differential liability, compulsory insurance and compensation fund, and legal personality for intelligent robots are several potential legal solutions. However, that the legislator or court will ultimately choose which solution still needs an all—round justification to achieve the goal of balancing the interests of the law.[413]

The **South African** country report clarifies that the absence of case law on the issue of harm caused by a robot means that we can only speculate about how such liability would be apportioned in South African law – an important determinant in how that liability will be apportioned is whether specific kinds of robot are endowed with legal capacity. Without such an endowment, torts committed by robots are likely to be in regulated terms of products liability. In that case the manufacturer of the robot will be held strictly liable for the harm caused.[414] By contrast, if specific robots are endowed with

[409] BIICI, "Introduction to English Tort Law".
https://www.biicl.org/files/763_introduction_to_english_tort_law.pdf
[410] *Donoghue v Stevenson* [1932] AC 562; *Caparo v Dickman* [1990] 2 AC 605
[411] Port.: Código Civil Brasileiro, Law N. 10.406, of 10 January 2002.
http://www.planalto.gov.br/ccivil_03/leis/2002/l10406.htm
[412] Xiao, Si, and Cao Jianfeng, "On the civil liability of artificial intelligence", *Science of Law*, Vol. 35, 5, 2017, pp. 166-173.
[413] Ibid.
[414] See section on product liability in South Africa report. If it could be shown that the user of the robot/ AI satisfied the various elements of a tort (in using the robot/ AI as a tool) then the user could be held liable. However, if the AI/ Robot causes harm and it is not due to the fault of the user (or any of the other requirements

legal capacity then the apportionment of liability will depend on various factors. To hold the producer, importer, distributor or retailer of a robot liable (product liability) it must be shown that the impugned robot constitutes a good and that in terms of 'a cost-benefit-risk-utility analysis on the basis of reasonableness' the producer, importer, distributor or retailer ought to be held liable. Given the present state of South African law, the use of vicarious liability in respect of a robot will therefore require development of the common law or legislative enactment. In the event of such development, the imposition of liability will turn on whether the robot is regarded as having acted independently of its employer and whether the robot commits the tort within the course and scope of its employment. There is, as yet, no indication of how South African courts (and legislatures) will respond to these questions.

At the current state of technological sophistication, most damage caused by robots will be easily accommodated within the **U.S.** fault-based system of products liability. Under products liability law, the manufacturer of a robot is liable for damage that results from design, warning, or manufacturing defects,[415] whereas the user of the product is liable for damage resulting from misuse of the product. More complicated issues will arise when there is no easily identifiable manufacturer[416] or the damage is not physical.[417]

6.7 Other key specific legal issues at the forefront

The table below highlights some other key specific legal issues related to either AI and/or robotics that the study teams identified or came across during their research as being at the forefront in the countries studied.

Other issues	Country
AI	
AI and robotics developments in the healthcare sector (screening and diagnosis)	Germany
AI in the judicial system/use of algorithms in policing decision-making and the justice system	China, UK
Cybersecurity and personal information protection	China
AI contracting issues: can sufficiently autonomous AI can enter into a contract on behalf of a person?	South Africa
High-frequency trading regulation/algorithmic trading	USA
Labour and taxation (AI and robotics jobs automation, work risk prevention)	USA, Spain
Transparency and accountability in algorithmic decision-making	USA
Misinformation and content moderation (social media algorithms)	USA
Robotics	
AI and robotics developments in the healthcare sector (screening and diagnosis)	Germany
Restricting robot surveillance	Germany

for a tort were not satisfied by the user) then South African products liability regime allows for the manufacturer or producer to be held liable (rather than the user).

[415] Hubbard, F. Patrick, "Sophisticated Robots": Balancing Liability, Regulation, and Innovation", *Florida Law Review,* Vol. 66, 2015, pp. 1821. https://scholarship.law.ufl.edu/flr/vol66/iss5/1/

[416] Silver, Andrew, "Who's Liable for George Hotz's Self-Driving Software?", *IEEE Spectrum*, December 14, 2016. https://spectrum.ieee.org/cars-that-think/transportation/self-driving/whos-liable-for-george-hotzs-selfdriving-software

[417] Calo, "Robotics and the Lessons of Cyberlaw", op. cit., 2015, pp. 541.

Other issues	Country
AI	
Criminal liability/responsibility for acts of robots	Spain
Regulating autonomous vehicles and unmanned aircraft	USA, Poland, Netherlands
Regulation/prohibitions on fully autonomous weapons	USA
Labour and taxation (AI and robotics jobs automation, work risk prevention)	USA, Spain

Table 8: Other key legal issues covered/discussed at the national level

Many of the above issues are also being debated at the international and EU-levels.

6.8 Gaps and challenges analysed in the national reports

The national reports identified a number of gaps and challenges, which we discuss below. Some are connected to the sufficiency of policy and laws and their application and/or interpretation. These gaps and challenges are also affected by the level of use and application of AI and robotics technologies.

The national reports show there are few **AI/robotics-specific regulations**, except in limited cases (e.g., autonomous vehicles, drones). This is both an advantage and a challenge, as existing laws and regulations which address such issues directly or indirectly may fail to take into account the creative uses and impacts of AI and robotics on individuals and society.

The **lack of regulatory bodies** has also been highlighted – and this is especially relevant where strong calls for such bodies have been made and where the remit of existing regulatory bodies falls short.

The **sufficiency and adequacy of existing national laws was also questioned**. For example, the Swedish national report points that the existing law could apply or accommodate issues of discrimination; whether it is a suitable means for tackling the issue of algorithmic discrimination is a whole other matter. Given the effectiveness of the law is unclear and would depend on how the law was interpreted and adapted to new technologies,[418] there is also the concern that types of discrimination may become far more advanced and difficult to envisage than accounted for in law. The German report highlights that existing regulations are not adequate to regulate AI&R issues, e.g., it is not clear that the new data protection regulation is sufficient to protect privacy (perhaps it is too soon to tell). Further, it is not clear in all cases how the product liability would be interpreted if harm or damage was caused as consequence of using a robot. In the Netherlands, the adequacy of principles of proper administration to provide effective legal protection regarding automated decision-making by government, was questioned. In South Africa, questions regarding the endowment of AI or robots with legal capacity and the problem of the attributing of liability in tort and contract are, as yet, unanswered. The USA report also points out that **without proactive measures by state or federal legislatures to clarify how existing laws apply to new technologies**, interpretation of existing falls to courts, which can potentially **lead to inconsistent and unpredictable results.**

There are differences in the nature and sophistication of the legal academic debates on AI and robotics. In some countries such discussions are lacking. e.g., Poland, there are **barely any legal academic debates on AI and robotics**. The China report highlights the need to continue to strengthen frontier

[418] See USA report.

research and discussions on legal issues related to AI and robotics and provide resources for future legislation and judicial trials related to AI and robotics.

Another highlighted challenge is the **lack of judicial knowledge about how AI /robots work** and the need for proper training (e.g., Spain).

The **concepts of AI and robotics and their legal status** themselves present gaps and challenges (which is something that also affected the current research). For example, the unsettled legal definition of 'AI' or 'robot' and their legal status is seen a challenge in Spain. Questions have been posed about whether it has become necessary to create new concepts in France, in particular that of a new legal entity for AI and smart robots. Though there is significant disagreement among French legal experts on this question, it appears from the research conducted that the dominant perspective is that it is not yet the time to create a new legal entity to highly sophisticated automated systems; it is too early, given the current state of technological developments, to promote the creation of a new regime conferring legal rights to robots. The Greek report highlights that the possibility of an electronic agent acquiring full autonomy when contracting with a person (or even another electronic agent?) is also a legal matter which will probably have to be addressed sometime in the future; this depends on the progress of technology in this domain in Greece. **The legal status of robots and automated systems** is also relevant in considering liability issues; this **is another grey area**. For instance, the South African report highlights that the endowment of AI/ robot's with legal capacity and the problem of the attributing of liability in tort and contract are, as yet, unanswered.

Doubts have been expressed in French legal literature about the **usefulness of regulating AI and robotics through ethical frameworks** and whether soft regulation can replace the legislative response.

One point raised/a continued issue is the **algorithmic discrimination and the perpetuation of injustice** - this issue might become more embedded or invisible and entrenched as technology develops and algorithmic decision-making is more widely used. While existing anti-discrimination or equality laws and data protection law might help, these might not suffice in all cases. This was highlighted, for example, in the Greek and UK reports. Calls have been made for robust regulation to increase public trust.

Another major point highlighted is **whether existing fundamental rights provisions are resilient** to deal with issues of AI and robotics (cf. Netherlands report).

7. Discussion and general analysis

This section briefly considers our preceding findings, in as much possible, recognising that this is a difficult exercise, given the fundamental structural, constitutional and practical legal differences in the three levels of analysis – international, regional and national.

Convergences, divergences and gaps
Convergences in international, EU and national law (as studied in this report) are evident in terms of the existence of human rights laws and principles that can be extended or applied to AI and/or robotics. Naturally, none of the human rights instruments the research looked at, specifically address 'AI' or 'robotics' though their framework or principles could well be extended and applied to AI and/or

robotics (some recommend, it is often desirable to formulate legislation in a technology neutral way to stop it becoming quickly obsolete[419]).

At the international, EU and national levels there are also currently, no AI and/or robotics specific regulatory bodies (though this position might change in the future and there are many calls for the creation of these, whether justified or unjustified, depending on context for this).

Though some exploratory work and policy views are evident, there has not been a breakthrough, headway in addressing legal personhood issues for AI and/or robotics at either of the three levels – while this issue has been raised (and will continue to be at the forefront of legal debates for the near future), international or even regional-level agreement[420] on this (i.e., whether legal personhood should be offered to AI systems/robots and what form this should take) might be difficult or near impossible to achieve. As Pagallo suggests with regards to the legal personhood of AI robots, "granting someone, or something, legal personhood is—and always has been—a highly sensitive political issue".[421] Some countries will definitely promote the creation of legal personality for AI and/or robots. Burri presents some insights on this, suggesting:

> States have to review their international legal obligations. One State may go forward and enable the creation of artificially intelligent entities; other States may be bound by treaty law to recognise the legal personality of such entities. Within the European Union's internal market, measures against artificially intelligent entities will be lawful, if the measures specifically target uncontrolled entities with a view to ensuring that a natural person can be held criminally liable when entities have been involved in crimes. But outside the Union in international law, the adoption of such measures may only be lawful after mutual recognition treaties have been changed. If this proves to be the case (and if such measures are desirable), treaty amendment procedures will have to be triggered as soon as possible. Even States that are not under any kind of international obligation to recognise uncontrolled foreign artificially intelligent entities need to decide whether to oppose such foreign entities, since some States will likely tolerate the practice. Irrespective of any legal obligations, the effects of such toleration will be felt worldwide.[422]

At all three levels (international, national and EU), the issue of lack of clarity and guidance being provided by existing regulators on how to apply or interpret existing legislation to address issues related to robotics and AI, has and is being addressed (incentivised by technological developments, investments, policy and regional/national strategic focuses on AI, for example).

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[419] Koops suggests "legislation should abstract away from concrete technologies to the extent that it is sufficiently sustainable and at the same provides sufficient legal certainty. Depending on a number of criteria, such as the goal of the regulation at issue, the nature and turbulence of the technology at stake, the urgency of providing legal certainty, and the scope for interpreting the regulation, there are several ways to deal with this trade-off. Through multi-level legislation, open-ended formulations, and a mixed approach of abstract and concrete rules that are periodically evaluated, adequate legal certainty with respect to current technologies may be ensured, while at the same time sufficient scope is given for future technological developments." See Koops, Bert-Jaap, "*Should ICT Regulation Be Technology-Neutral?*", in Bert-Jaap Koops et al. (eds.), *Starting points for ICT regulation: deconstructing prevalent policy one-liners*, vol. 9, The Hague: T.M.C. Asser Press, 2006, pp. 77-108.

[420] See Delcker, Janosch, "Europe divided over robot 'personhood', *Politico,* 11 April 2018 (*u*pdated 13 April 2018). https://www.politico.eu/article/europe-divided-over-robot-ai-artificial-intelligence-personhood/

[421] Pagallo, Ugo, "Vital, Sophia, and Co.—The Quest for the Legal Personhood of Robots" *Information* 9, No. 9 2018, p. 230.

[422] Burri, Thomas, "International Law and Artificial Intelligence", *German Yearbook of International Law* 2017, vol. 60, pp. 91-108. http://dx.doi.org/10.2139/ssrn.3060191

The state of legislative play is also very divergent at the three levels given the diversity of countries, institutions, their mandates, powers and political will. Gaps and challenges are evident in all three cases (though the identification of these is limited). Some of these are common (e.g., lack of solid or organised policies by national governments, parallel developments, discrepancy in approaches). Others are more specific and pertain to the region (e.g., in some cases a lack of legislation and guidance on applying existing legislation to AI and robotics is evident; in others, fast-paced and overwhelming developments are evident e.g., the EU changes in data protection law and the availability of new tools and courses of legal action).

Some issues such as lethal autonomous weapons, cross-country AI-based surveillance, cryptocurrencies, need, and might be best addressed by a global, international approach. One call for action at the international level is evident in Erdélyi and Goldsmith's recommendation for the "establishment of an international AI regulatory agency that — drawing on interdisciplinary expertise — could create a unified framework for the regulation of AI technologies and inform the development of AI policies around the world".[423] They propose the creation of an International Artificial Intelligence Organization (IAIO) "as a new IGO, which could initially serve as a focal point of policy debates on AI-related matters and — given sufficient international support — acquire increasing role in their regulation over time".[424] There are challenges to this and the international general governance of AI or robotics might be affected by whether States have an interest in cooperating and reaching agreement on such matters. E.g., a country might have a burgeoning and profitable industry in a specific AI or robotics domain that might be adversely affected by its cooperating at the international level to regulate such activity.

Other issues are best dealt with at the regional or EU-level ((where agreement on principles and law can be reached, e.g., as has occurred in the case of EU data protection law, though not without challenges). Ultimately, given the differences in political strategy (some countries are far more widely ambitious in their strategies and developments than others[425]), legal and ethical cultures, states of technological development, the use, transfer (import and export) and implementation of AI and robotics, complexity of issues, and the impacts on individuals, national law (primary[426] or secondary legislation[427]) and jurisprudence will be the better locale for the resolution of issues and impacts related to AI and/or robotics (though international/regional law might provide the framing). International or regional legislation that is not grounded or takes into account the diverse national environments might work to limit the development and adoption of and/or robotics in countries which will then, in turn, adversely affect a country's growth and progress.

To legislate or not to, that is the question

This question in turn raises a plethora of other questions (such as, the need, the nature of such legislation, at what level, how this might occur, which body might take the lead, resources). Do we

[423] Erdélyi, Olivia J., and Judy Goldsmith, "Regulating artificial intelligence: Proposal for a global solution", *Proceedings of the 2018 AAAI/ACM Conference on AI, Ethics, and Society*, ACM, 2018. https://par.nsf.gov/servlets/purl/10066933
[424] Erdélyi, Olivia J., and Judy Goldsmith, "Regulating artificial intelligence: Proposal for a global solution", *Proceedings of the 2018 AAAI/ACM Conference on AI, Ethics, and Society*, ACM, 2018. https://par.nsf.gov/servlets/purl/10066933
[425] E.g., China
[426] E.g. Acts of Parliament or Statutes.
[427] E.g., Statutory Instruments or Codes, Orders, Regulations, Rules.

need an international instrument on addressing human rights issues of AI and/or robotics and the convergence of such technologies (which is often unaddressed and is increasingly becoming relevant given its impact on the individual)? At the EU-level, while there might be limited scope for a Regulation of Directive (unless this is scoped narrowly to fit a specific domain and application), Decisions, Recommendations and Opinions might be brought further into play to address legal issues and provide guidance. At the national level, more legislative movements are expected (especially for specific applications where there are none as such technologies are not yet in use). Also, the convergence of AI and/or robotics technologies with the human might stretch the bounds of existing law e.g., in terms of autonomy, identity and justice.

In relation to AI, many have recommended a cautious and staged approach[428] (no need for AI-specific regulation as existing laws can well accommodate its development and use and before taking any action to adequately explore, discuss, analyse and consider all implications to identify genuine gaps)[429]. We recommend paying heed to this though there might be regional and/or national AI policy triggers that put paid to this. Similarly, in relation to robotics, Leenes et al suggest "at a general level, a transparent and carefully tailored regulatory environment appears to be a key element for the development of a robotics and autonomous systems market, where products and services can be incubated, tested in real environments, and eventually launched."[430] Further they underline, "More specifically, the effect of applicable rules needs to be carefully pondered. Some technologies may indeed raise complex ethical and social issues that cannot be overlooked. Yet even in such cases, regulation should be attentively designed not to merely impair the development of a supply side of the economy for those specific devices".[431]

8. Conclusion

Issues

As shown in section 3, AI and/or robotics presents various legal issues and challenges with wide-ranging societal and human rights implications. Some of such issues are at the forefront of current policy debates; some are well-addressed by existing legislation, others less so. Some human rights issues have been/are being well-addressed at regional and/or national level (e.g., data protection, non-discrimination, safety), while others are not so much in the forefront of legal and/or policy discussions though they ought to be (e.g., human autonomy, self-determination and equity, freedoms). AI and

[428] Reed, suggests, "Where AI clearly creates risks which current law and regulation cannot deal with adequately, then new regulation will be needed". He also states "A 'wait and see' approach is likely to produce better long-term results than hurried regulation based on, at best, a very partial understanding of what needs to be regulated." Reed, Chris, "How should we regulate artificial intelligence?" *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 376.2128, 2018: 2017036

[429] See House of Lords Select Committee on Artificial Intelligence, *Report of Session 2017-19, AI in the UK: ready, willing and able?,* House of Lords, 16 April 2018. https://publications.parliament.uk/pa/ld201719/ldselect/ldai/100/100.pdf - "Regulation could have unintended consequences, including the stifling of development, innovation and competitiveness".

[430] Leenes, Ronald, Erica Palmerini, Bert-Jaap Koops, Andrea Bertolini, Pericle Salvini, and Federica Lucivero, "Regulatory challenges of robotics: some guidelines for addressing legal and ethical issues" *Law, Innovation and Technology* 9, no. 1, 2017, pp. 1-44.

[431] Leenes et al, op. cit., 2017.

robotics technologies are and may start producing even more significant impacts on these, that in turn would adversely human life and choices.

As AI and robotics technologies progress, there will be further (amplified) legal issues and impacts on human rights that will need further monitoring and research. As technological advances charge ahead (and they will) via data-driven innovation and intelligent machines (that complement or supplant the human and human capabilities). AI is at the forefront of discussions at the moment, more than robotics, but we expect the convergence of the technologies (AI, robotics, IoT) will change this. The convergence of technologies and the human is also relevant and needs to be addressed – this is something that poses its own unique dilemma for the law.

International level, EU and national levels– where do we go from here?

As outlined in Section 4, we recommend that the **international** legislators and the legal community:

- pay particular attention to the global impacts of AI and robotics and the more vulnerable international communities that need protection (who would be left behind) ('AI' divides)
- should determine the challenges that need prioritising,
- set clear ground rules on what AI and robotics applications are not permitted under international human rights law,
- determine how international actors (state and multi-national corporations leading the AI and robotics revolutions) could practically implement their human rights obligations through positive and negative incentives,
- determine how to address the negative impacts caused by the import and export of AI developed in one country into another for whose environment it is not suited or does not take into account local peculiarities (which has the result of creating highly damaging effects on human rights).

One other particular issue that needs to be discussed is highlighted by Burri in relation to AI - i.e., how international standards that "defy the categories of international law" (or super soft law) are being created by an amorphous and leaderless 'legislature' that operates outside or by bypassing traditional law-making fora and comprises "interested individuals, professional associations, social and natural scientists, companies, and civil society organisations".[432] While, as Burri suggests, these standards "will be persuasive on their merits and imbued with a strong compliance pull, despite their non-binding form", questions remain about their validity (depending on who developed the standard, whether relevant stakeholders were represented and active in its development), usefulness, and ultimate legality, if such standards are supported, or mandated by law.[433]

At the **EU-level**, section 5.4 highlights the proactiveness of the EU institutions in legislating and providing guidance (with varying degrees) to address AI and/or robotics challenges and how the adequacy of the EU legal framework to meet the challenges of AI and robotics is highly differentiated depending on the field. Recent legal developments, particularly in data protection as applicable to AI are seen as promising but as highlighted their potential effectiveness largely depends on indirect guarantees that may or may not be used by individuals and consequent enforcement. One open question is to what extent, in the context of AI and robotics, should the EU law expand to non-harmonised areas of civil liability for damages. For some areas such as intellectual property of work

[432] Burri, Thomas, "International Law and Artificial Intelligence", *German Yearbook of International Law* 2017, vol. 60, pp. 91-108. http://dx.doi.org/10.2139/ssrn.3060191
[433] Burri, op. cit., 2017.

created by AI, the current EU framework does not provide clear answers to some of the challenges and could be an area to further discuss legal solutions.

One emerging recommendation would be to set up a **global legal AI and/or robotics observatory** at the international (UN, Council of Europe) or EU-level with inputs from international/regional and national rapporteurs. The Observatory would help systematically monitor and bring together not only legislation, but developments, case law, emerging legal issues and would inform future legislative work.

At the **national** level, as shown in section 6, legal academic discourses are established in some countries, while in others they are in their infancy. In many cases, issues pertaining to AI and robotics have attracted the high-level attention of political parties. Overall, there were no major or significant amendments in legislation bearing on constitutional or human rights in direct response to AI and robotics developments reported in the country research for the last five to ten years. In some countries, even in the future this is extremely unlikely to happen (such issues are projected to be left to the courts to adjudicate based on existing laws). With regard to plans to create or adopt new legislation to specifically regulate 'AI' or 'robotics', most countries have adopted a cautious or slow response which has required or left existing laws to be creatively applied or existing regulatory bodies to step in. The national research revealed no regulatory bodies have been created specifically to regulate AI or robotics, though there have been calls for these. Case law identified focussed on various issues.

Various **gaps and challenges** were identified by the research, e.g., lack of AI and robotics-specific regulations (other than those related to autonomous vehicles, drones – this is a challenge where issues with high impacts on individuals or society are not or seen not to be addressed), lack of new regulatory bodies where existing ones fall short, sufficiency and adequacy of existing national laws, lack of clarification on the application of existing laws, lack of legal academic debates in some countries, lack of judicial knowledge and training, greyness in the legal status of robots and automated systems. Concerns were raised regarding the usefulness of regulating AI and robotics through ethical frameworks and whether soft regulation could replace the legislative response. Concerns were also raised about algorithmic discrimination and the perpetuation of injustice and whether existing fundamental rights provisions are resilient to deal with issues of AI and robotics. Regional and European orders and institutions could play a vital role in helping countries to further evaluate and discuss such issues or present guidance to address such issues.

One key recommendation for the national level is for countries to carry out a **regulatory impact assessment**[434] and consider adequately AI and/or robotics in context (and take into account their impacts – ethical, legal, social, economic, political, environmental) before legislating in relation to them. **Legal foresight** which is a rarely used tool, would well support such an exercise. As Andrade argues "that law-making processes should be complemented with foresight techniques. Legislators should thus have at their disposal the largest quantity and quality of information available about the

[434] An RIA (or simply Impact Assessment, IA) is "a systematic and mandatory appraisal of how proposed primary and-or secondary legislation will affect certain categories of stakeholders, economic sectors, and the environment." Radaelli, Claudio M. and Fabrizio De Francesco, "Regulatory impact assessment", in Robert Baldwin, Martin Cave, and Martin Lodge (eds.), *The Oxford Handbook of Regulation,* Oxford University Press, Oxford, pp. 279-301.

society, the people and the environment that their laws address and apply to".[435] This would greatly benefit and advance legal discussions on AI and/or robotics.

This report will inform the work of forthcoming SIENNA tasks, especially *Task 5.6 Enhancement of the existing legal framework by networking with legislators and relevant committees.* Task 5.6 will, based on the results presented here, will identify potential changes needed in the existing legal and human rights frameworks (i.e., international, EU and/or national) that might be necessary or desirable in order to create an environment in which the proposed codes of conduct could be implemented most effectively. This will be done in consultation with regulators, policy-makers at the EU and national level and legal experts in the project's Advisory Board. This will lead to recommendations for the enhancement of the existing EU and international legal framework.

[435] Andrade, Norberto, "Law, Foresight and Big Data", The Internet, Policy & Politics Conferences, 2012. http://blogs.oii.ox.ac.uk/ipp-conference/2012/programme-2012/track-b-policy/panel-6b-legislation-and-public-policy/norberto-andrade-law-foresight-and-big.html

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Annex 1 Template and instructions for country studies

1. **Introduction**: write a short note on the country's type of legal system, sources of law and relationship with international law, objectives of the report, methodology, identify key recent academic land policy legal discourses in the country on regulation of AI and robotics (last five years)
2. **Scope and limitations**: write a short note on the scope and limitations and include any challenges faced in producing the report.
3. **Legal developments:** analyse the below questions by referring to legislation portals, official law publications, Parliamentary bills, legal newsletters, information from newsletters of national or local legal firms. Developments should cover last five to ten years.

   Questions to cover:
   - Have developments in AI (i.e., automated decision-making systems, algorithmic systems, machine learning) and robotics led to amendments in constitutional or human rights and/or legislation bearing on constitutional or human rights?
   - Have there been/are there attempts or plans to create or adopt new legislation in response to developments in AI and robotics (e.g., granting legal personhood to robots, prescribing civil or criminal liability for harms caused), or to regulate[436] how AI and robotics applications are designed, set up, commissioned or used? (e.g., regulation of algorithmic development or restrictions on the use of robots in certain conditions or sectors)
   - Are there new regulatory bodies being set up to regulate AI and robotics? What are the developments on this front? (e.g., AI watchdogs, AI commission, Robotics commission)
   - Identify any significant case law or judgments[437] addressing human rights challenges[438] of AI and robotics (if there are no judgments, you can refer to legal doctrine)
   - Highlight any other relevant, potential future legal developments relating to AI and robotics identified in authoritative legal sources (i.e., official green or white papers, parliamentary or law commission reports) in your country
   - Provide any additional information that might be relevant (and not considered above).

4. **Specific legal issues**: Please explore the below-listed specific legal issues by looking at legislation, legal discourse and requests for information from legal scholars or lawyers in your country. Please keep track of such requests and get consent to publish the information they share (either as a quote or anonymously). [include a note on this in the methodology section].

   - AI:
     - Algorithmic bias and discrimination (including automated decision-making systems), i.e., how does the law deal with issues of algorithmic bias and discrimination?

[436] This could be to restrict or advance the development or use of such applications.
[437] Limited only to decisions in the highest courts – unless going further in depth is warranted.
[438] For example, discrimination, inequality, privacy infringements, unfavourable work conditions, harm to life, bodily integrity, human safety and welfare, liability etc.

    - Intellectual property issues related to works created by AI, i.e., does the law ascribe intellectual property rights (e.g., copyright, patent right, design rights, trademarks etc) for AI generated works or inventions? Who owns such intellectual property rights? [Look at intellectual property law journals, talk to IP legal academics, lawyers]

- Robotics:
    - Creation of a specific legal status for robots i.e., legal personhood or electronic personality, i.e., has the law created/does the law recognise a specific legal status for robots? Are there any movements in this direction? [Other relevant terms that crop up in the literature include: 'synthetic entities', autonomous system]
    - Safety and civil liability issues: who is liable for damage caused by robots? [Try also other search words such as: autonomous vehicles, driverless cars, automated vehicles, autonomous machines, drones.]

- Other key specific legal issues related to AI and robotics that are at the forefront and how they are being addressed [as can be identified from coverage in current or proposed legislation, Parliamentary debates, enquiries or reports, Law Commission reports, reports of regulators such as data protection authorities]

5. **Brief analysis of gaps and challenges**: Cover what are the gaps in the law? What challenges are evident from the preceding research? Include a comment on whether the law offers adequate protections for human rights affected by AI and robotics.
6. **Conclusion**
7. **References**

Annex 2 Country studies

Please see individual country reports.

1. **Brazil** (*Universidade Federal do Rio de Janeiro)*
2. **China** (*Dalian University of Technology*)
3. **France** (*Sciences Po*)
4. **Germany** (*EUREC*)
5. **Greece** (*Ionian University*)
6. **Netherlands** (*Twente University*)
7. **Poland** (*Helsinki Foundation for Human Rights*)
8. **South Africa** (*University of Cape Town*)
9. **Spain** (*University of Granada*)
10. **Sweden** (*Uppsala University*)
11. **United Kingdom** (*Trilateral Research*)
12. **United States of America** (*Berkman Klein Center*)