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DRAFT REPORT

with recommendations to the Commission on Civil Law Rules on Robotics
(2015/2103(INL))

Committee on Legal Affairs

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(Initiative – Rule 46 of the Rules of Procedure)

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MOTION FOR A EUROPEAN PARLIAMENT RESOLUTION

with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL))

The European Parliament,

- having regard to Article 225 of the Treaty on the Functioning of the European Union,
- having regard to Rules 46 and 52 of its Rules of Procedure,
- having regard to the report of the Committee on Legal Affairs and the opinions of the Committee on Employment and Social Affairs, the Committee on the Environment, Public Health and Food Safety, the Committee on Industry, Research and Energy and the Committee on the Internal Market and Consumer Protection (A8-0000/2016),

Introduction

- A. whereas from Mary Shelley's *Frankenstein's Monster* to the classical myth of *Pygmalion*, through the story of Prague's *Golem* to the robot of Karel Čapek, who coined the word, people have fantasised about the possibility of building intelligent machines, more often than not androids with human features;
- B. whereas now that humankind stands on the threshold of an era when ever more sophisticated robots, bots, androids and other manifestations of artificial intelligence ("AI") seem poised to unleash a new industrial revolution, which is likely to leave no stratum of society untouched, it is vitally important for the legislature to consider all its implications;
- C. whereas between 2010 and 2014 the average increase in sales of robots stood at 17% per year and in 2014 sales rose by 29%, the highest year-on-year increase ever, with automotive parts suppliers and the electrical/electronics industry being the main drivers of the growth; whereas annual patent filings for robotics technology have tripled over the last decade;
- D. whereas in the short to medium term robotics and AI promise to bring benefits of efficiency and savings, not only in production and commerce, but also in areas such as transport, medical care, education and farming, while making it possible to avoid exposing humans to dangerous conditions, such as those faced when cleaning up toxically polluted sites; whereas in the longer term there is potential for virtually unbounded prosperity;
- E. whereas at the same time the development of robotics and AI may result in a large part of the work now done by humans being taken over by robots, so raising concerns about the future of employment and the viability of social security systems if the current basis of taxation is maintained, creating the potential for increased inequality in the distribution of wealth and influence;
- F. whereas the causes for concern also include physical safety, for example when a robot's code proves fallible, and the potential consequences of system failure or hacking of

connected robots and robotic systems at a time when increasingly autonomous applications come into use or are impending whether it be in relation to cars and drones or to care robots and robots used for maintaining public order and policing;

- G. whereas many basic questions of data protection have already become the subject of consideration in the general contexts of the internet and e-commerce, but whereas further aspects of data ownership and the protection of personal data and privacy might still need to be addressed, given that applications and appliances will communicate with each other and with databases without humans intervening or possibly without their even being aware of what is going on;
- H. whereas the 'soft impacts' on human dignity may be difficult to estimate, but will still need to be considered if and when robots replace human care and companionship, and whereas questions of human dignity also can arise in the context of 'repairing' or enhancing human beings;
- I. whereas ultimately there is a possibility that within the space of a few decades AI could surpass human intellectual capacity in a manner which, if not prepared for, could pose a challenge to humanity's capacity to control its own creation and, consequently, perhaps also to its capacity to be in charge of its own destiny and to ensure the survival of the species;
- J. whereas several foreign jurisdictions, such as the US, Japan, China and South Korea, are considering, and to a certain extent have already taken, regulatory action with respect to robotics and AI, and whereas some Member States have also started to reflect on possible legislative changes in order to take account of emerging applications of such technologies;
- K. whereas European industry could benefit from a coherent approach to regulation at European level, providing predictable and sufficiently clear conditions under which enterprises could develop applications and plan their business models on a European scale while ensuring that the EU and its Member States maintain control over the regulatory standards to be set, so as not to be forced to adopt and live with standards set by others, that is to say the third states which are also at the forefront of the development of robotics and AI;

General principles

- L. whereas, until such time, if ever, that robots become or are made self-aware, Asimov's Laws¹ must be regarded as being directed at the designers, producers and operators of robots, since those laws cannot be converted into machine code;
- M. whereas, nevertheless, a series of rules, governing in particular liability and ethics and

¹ (1) A robot may not injure a human being or, through inaction, allow a human being to come to harm. (2) A robot must obey the orders given it by human beings except where such orders would conflict with the First Law. (3) A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws (See Runabout, I. Asimov, 1943) and (0) A robot may not harm humanity, or, by inaction, allow humanity to come to harm.

reflecting the intrinsically European and humanistic values that characterise Europe's contribution to society, are necessary;

- N. whereas the European Union could play an essential role in establishing basic ethical principles to be respected in the development, programming and use of robots and AI and in the incorporation of such principles into European regulations and codes of conduct, with the aim of shaping the technological revolution so that it serves humanity and so that the benefits of advanced robotics and AI are broadly shared, while as far as possible avoiding potential pitfalls;
- O. whereas a gradualist, pragmatic cautious approach of the type advocated by Jean Monnet¹ should be adopted for Europe;
- P. whereas it is appropriate, in view of the stage reached in the development of robotics and AI, to start with civil liability issues and to consider whether a strict liability approach based on who is best placed to insure is not the best starting point;

Liability

- Q. whereas, thanks to the impressive technological advances of the last decade, not only are today's robots able to perform activities which used to be typically and exclusively human, but the development of autonomous and cognitive features – e.g. the ability to learn from experience and take independent decisions – has made them more and more similar to agents that interact with their environment and are able to alter it significantly; whereas, in such a context, the legal responsibility arising from a robot's harmful action becomes a crucial issue;
- R. whereas a robot's autonomy can be defined as the ability to take decisions and implement them in the outside world, independently of external control or influence; whereas this autonomy is of a purely technological nature and its degree depends on how sophisticated a robot's interaction with its environment has been designed to be;
- S. whereas the more autonomous robots are, the less they can be considered simple tools in the hands of other actors (such as the manufacturer, the owner, the user, etc.); whereas this, in turn, makes the ordinary rules on liability insufficient and calls for new rules which focus on how a machine can be held – partly or entirely – responsible for its acts or omissions; whereas, as a consequence, it becomes more and more urgent to address the fundamental question of whether robots should possess a legal status;
- T. whereas, ultimately, robots' autonomy raises the question of their nature in the light of the existing legal categories – of whether they should be regarded as natural persons, legal persons, animals or objects – or whether a new category should be created, with its own specific features and implications as regards the attribution of rights and duties, including liability for damage;
- U. whereas under the current legal framework robots cannot be held liable per se for acts or

¹ Cf. the Schuman Declaration (1950: "Europe will not be made all at once, or according to a single plan. It will be built through concrete achievements which first create a de facto solidarity."

omissions that cause damage to third parties; whereas the existing rules on liability cover cases where the cause of the robot's act or omission can be traced back to a specific human agent such as the manufacturer, the owner or the user and where that agent could have foreseen and avoided the robot's harmful behaviour; whereas, in addition, manufacturers, owners or users could be held strictly liable for acts or omissions of a robot if, for example, the robot were categorised as a dangerous object or if it fell within product liability rules;

- V. whereas in the scenario where a robot can take autonomous decisions, the traditional rules will not suffice to activate a robot's liability, since they would not make it possible to identify the party responsible for providing compensation and to require this party to make good the damage it has caused;
- X. whereas the shortcomings of the current legal framework are apparent in 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 make the traditional rules inapplicable, which highlights the need for new, more up-to-date ones;
- Y. whereas, as regards non-contractual liability, Council Directive 85/374/EEC of 25 July 1985¹ can only cover damage caused by a robot's manufacturing defects and on condition that the injured person is able to prove the actual damage, the defect in the product and the causal relationship between damage and defect (strict liability or liability without fault);
- Z. whereas, notwithstanding the scope of the Directive 85/374/EEC, the current legal framework would not be sufficient to cover the damage caused by the new generation of robots, insofar as they can be equipped with adaptive and learning abilities entailing a certain degree of unpredictability in their behaviour, since these robots would autonomously learn from their own, variable experience and interact with their environment in a unique and unforeseeable manner;

General principles concerning the development of robotics and artificial intelligence for civil use

1. Calls on the Commission to propose a common European definition of smart autonomous robots and their subcategories by taking into consideration the following characteristics of a smart robot:
 - o acquires autonomy through sensors and/or by exchanging data with its environment (inter-connectivity) and trades and analyses data
 - o is self-learning (optional criterion)
 - o has a physical support

¹ 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 (OJ L 210, 7.8.1985, p. 29).

- o adapts its behaviours and actions to its environment;
- 2. Considers that a system of registration of advanced robots should be introduced, and calls on the Commission to establish criteria for the classification of robots with a view to identifying the robots that would need to be registered;
- 3. Underlines that many robotic applications are still in an experimental phase; welcomes the fact that more and more research projects are being funded with national and European money; calls on the Commission and the Member States to strengthen financial instruments for research projects in robotics and ICT; emphasises that sufficient resources need to be devoted to the search for solutions to the social and ethical challenges that the technological development and its applications raise;
- 4. Asks the Commission to foster research programmes that include a mechanism for short-term verification of the outcomes in order to understand what real risks and opportunities are associated with the dissemination of these technologies; calls on the Commission to combine all its effort in order to guarantee a smoother transition for these technologies from research to commercialisation on the market;

Ethical principles

- 5. Notes that the potential for empowerment through the use of robotics is nuanced by a set of tensions or risks relating to human safety, privacy, integrity, dignity, autonomy and data ownership;
- 6. Considers that a guiding ethical framework for the design, production and use of robots is needed to complement the legal recommendations of the report and the existing national and Union acquis; proposes, in the annex to the resolution, a framework in the form of a charter consisting of a code of conduct for robotics engineers, of a code for research ethics committees when reviewing robotics protocols and of model licences for designers and users;
- 7. Points out that the guiding ethical framework should be based on the principles of beneficence, non-maleficence and autonomy, as well as on the principles enshrined in the EU Charter of Fundamental Rights, such as human dignity and human rights, equality, justice and equity, non-discrimination and non-stigmatisation, autonomy and individual responsibility, informed consent, privacy and social responsibility, and on existing ethical practices and codes;

A European Agency

- 8. Calls for the creation of a European Agency for robotics and artificial intelligence in order to provide the technical, ethical and regulatory expertise needed to support the relevant public actors, at both EU and Member State level, in their efforts to ensure a timely and well-informed response to the new opportunities and challenges arising from the technological development of robotics;
- 9. Considers that the potential of robotics use and the present investment dynamics justify the European Agency being equipped with a proper budget and being staffed with regulators and external technical and ethical experts dedicated to the cross-sectorial

and multidisciplinary monitoring of robotics-based applications, identifying standards for best practice, and, where appropriate, recommending regulatory measures, defining new principles and addressing potential consumer protection issues and systematic challenges; asks the Commission and the European Agency to report to the European Parliament on the latest developments in robotics on an annual basis;

Intellectual property rights and the flow of data

10. Notes that there are no legal provisions that specifically apply to robotics, but that existing legal regimes and doctrines can be readily applied to robotics while some aspects appear to need specific consideration; calls on the Commission to come forward with a balanced approach to intellectual property rights when applied to hardware and software standards, and codes that protect innovation and at the same time foster innovation; calls on the Commission to elaborate criteria for an 'own intellectual creation' for copyrightable works produced by computers or robots;
11. Calls on the Commission and the Member States to ensure that, in the development of any EU policy on robotics, privacy and data protection guarantees are embedded in line with the principles of necessity and proportionality; calls, in this regard, on the Commission to foster the development of standards for the concepts of privacy by design and privacy by default, informed consent and encryption;
12. Points out that the use of personal data as a 'currency' with which services can be 'bought' raises new issues in need of clarification; stresses that the use of personal data as a 'currency' must not lead to a circumvention of the basic principles governing the right to privacy and data protection;

Standardisation, safety and security

13. Calls on the Commission to continue to work on the international harmonisation of technical standards, in particular together with the European Standardisation Organisations and the International Standardisation Organisation, in order to avoid fragmentation of the internal market and to meet consumers' concerns; asks the Commission to analyse existing European legislation with a view to checking the need for adaptation in light of the development of robotics and artificial intelligence;
14. Emphasises that testing robots in real-life scenarios is essential for the identification and assessment of the risks they might entail, as well as of their technological development beyond a pure experimental laboratory phase; underlines, in this regard, that testing of robots in real-life scenarios, in particular in cities and on roads, raises numerous problems and requires an effective monitoring mechanism; calls on the Commission to draw up uniform criteria across all Member States which individual Member States should use in order to identify areas where experiments with robots are permitted;

Autonomous vehicles

15. Considers that the automotive sector is in most urgent need of European and global rules to ensure the cross-border development of automated vehicles so as to fully exploit their economic potential and benefit from the positive effects of technological trends; emphasises that fragmented regulatory approaches would hinder implementation and

jeopardise European competitiveness; notes that although current private international law rules on traffic accidents applicable within the EU do not need urgent modification to accommodate the development of autonomous vehicles, simplifying the current dual system for defining applicable law (based on Regulation (EC) No 864/2007 of the European Parliament and of the Council¹ and the 1971 Hague Convention on the law applicable to traffic accidents) would improve legal certainty and limit possibilities for forum shopping;

Care robots

16. Points out that human contact is one of the fundamental aspects of human care; believes that replacing the human factor with robots could dehumanise caring practices;

Medical robots

17. Underlines the importance of appropriate training and preparation for doctors and care assistants in order to secure the highest degree of professional competence possible, as well as to protect patients' health; underlines the need to define the minimum professional requirements that a surgeon must meet in order to be allowed to use surgical robots; emphasises the special importance of training for users to allow them to familiarise themselves with the technological requirements in this field; draws attention to the rising trend towards self-diagnosis using a mobile robot which makes diagnoses and might take over the role of a doctor;

Human repair and enhancement

18. Notes the great potential of robotics in the field of repairing and compensating for damaged organs and human functions, but also the complex questions raised in particular by the possibilities of human enhancement; asks for the establishment of committees on robot ethics in hospitals and other health care institutions tasked with considering and assisting in resolving unusual, complicated ethical problems involving issues that affect the care and treatment of patients; calls on the Commission and the Member States to develop guidelines to aid in the establishment and functioning of such committees;

Drones (RPAS)

19. Stresses the importance of a European framework for remotely piloted aircraft systems (RPAS) to protect the safety, security and privacy of EU citizens, and calls on the Commission for a follow-up to the recommendations of the European Parliament resolution of 29 October 2015 on safe use of remotely piloted aircraft systems (RPAS), known as unmanned aerial vehicles (UAVs), in the field of civil aviation²;

Education and employment forecast

¹ Regulation (EC) No 864/2007 of the European Parliament and of the Council of 11 July 2007 on the law applicable to non-contractual obligations (Rome II) (OJ L 199, 31.7.2007, p. 40).

² Texts adopted, P8_TA(2015)0390.

20. Draws attention to the Commission's forecast that by 2020 Europe might be facing a shortage of up to 825 000 ICT professionals and that 90 % of jobs will require at least basic digital skills; welcomes the Commission's initiative of proposing a roadmap for the possible use and revision of a Digital Competence framework and descriptors of Digital Competences for all levels of learners;
21. Considers that getting more young women interested in a digital career and placing more women in digital jobs would benefit the digital industry, women themselves and Europe's economy; calls on the Commission and the Member States to launch initiatives in order to support women in ICT and to boost their e-skills;
22. Calls on the Commission to start monitoring job trends more closely, with a special focus on the creation and loss of jobs in the different fields/areas of qualification in order to know in which fields jobs are being created and those in which jobs are being destroyed as a result of the increased use of robots;
23. Bearing in mind the effects that the development and deployment of robotics and AI might have on employment and, consequently, on the viability of the social security systems of the Member States, consideration should be given to the possible need to introduce corporate reporting requirements on the extent and proportion of the contribution of robotics and AI to the economic results of a company for the purpose of taxation and social security contributions; takes the view that in the light of the possible effects on the labour market of robotics and AI a general basic income should be seriously considered, and invites all Member States to do so;

Liability

24. Considers that robots' civil liability is a crucial issue which needs to be addressed at EU level so as to ensure the same degree of transparency, consistency and legal certainty throughout the European Union for the benefit of consumers and businesses alike;
25. Asks the Commission to submit, on the basis of Article 114 of the Treaty on the Functioning of the European Union, a proposal for a legislative instrument on legal questions related to the development of robotics and artificial intelligence foreseeable in the next 10-15 years, following the detailed recommendations set out in the annex hereto; further calls on the Commission, once technological developments allow the possibility for robots whose degree of autonomy is higher than what is reasonably predictable at present to be developed, to propose an update of the relevant legislation in due time;
26. Considers that, whatever legal solution it applies to robots' liability in cases other than those of damage to property, the future legislative instrument should in no way restrict the type or the extent of the damages which may be recovered, nor should it limit the forms of compensation which may be offered to the aggrieved party, on the sole grounds that damage is caused by a non-human agent;
27. Considers that the future legislative instrument should provide for the application of strict liability as a rule, thus requiring only proof that damage has occurred and the establishment of a causal link between the harmful behaviour of the robot and the damage suffered by the injured party;

28. Considers that, in principle, once the ultimately responsible parties have been identified, their liability would be proportionate to the actual level of instructions given to the robot and of its autonomy, so that the greater a robot's learning capability or autonomy is, the lower other parties' responsibility should be, and the longer a robot's 'education' has lasted, the greater the responsibility of its 'teacher' should be; notes, in particular, that skills resulting from 'education' given to a robot should be not confused with skills depending strictly on its self-learning abilities when seeking to identify the person to whom the robot's harmful behaviour is actually due;
29. Points out that a possible solution to the complexity of allocating responsibility for damage caused by increasingly autonomous robots could be an obligatory insurance scheme, as is already the case, for instance, with cars; notes, nevertheless, that unlike the insurance system for road traffic, where the insurance covers human acts and failures, an insurance system for robotics could be based on the obligation of the producer to take out an insurance for the autonomous robots it produces;
30. Considers that, as is the case with the insurance of motor vehicles, such an insurance system could be supplemented by a fund in order to ensure that reparation can be made for damage in cases where no insurance cover exists; calls on the insurance industry to develop new products that are in line with the advances in robotics;
31. Calls on the Commission, when carrying out an impact assessment of its future legislative instrument, to explore the implications of all possible legal solutions, such as:
 - a) establishing a compulsory insurance scheme whereby, similarly to what already happens with cars, producers or owners of robots would be required to take out insurance cover for the damage potentially caused by their robots;
 - b) ensuring that a compensation fund would not only serve the purpose of guaranteeing compensation if the damage caused by a robot was not covered by an insurance – which would in any case remain its primary goal – but also that of allowing various financial operations in the interests of the robot, such as investments, donations or payments made to smart autonomous robots for their services, which could be transferred to the fund;
 - c) allowing the manufacturer, the programmer, the owner or the user to benefit from limited liability insofar as smart autonomous robots would be endowed with a compensation fund – to which all parties could contribute in varying proportions – and damage to property could only be claimed for within the limits of that fund, other types of damage not being subject to such limits;
 - d) deciding whether to create a general fund for all smart autonomous robots or to create an individual fund for each and every robot category, and whether a contribution should be paid as a one-off fee when placing the robot on the market or whether periodic contributions should be paid during the lifetime of the robot;
 - e) ensuring that the link between a robot and its fund would be made visible by an individual registration number appearing in a specific EU register, which would allow anyone interacting with the robot to be informed about the nature of the

fund, the limits of its liability in case of damage to property, the names and the functions of the contributors and all other relevant details;

- f) creating a specific legal status for robots, so that at least the most sophisticated autonomous robots could be established as having the status of electronic persons with specific rights and obligations, including that of making good any damage they may cause, and applying electronic personality to cases where robots make smart autonomous decisions or otherwise interact with third parties independently;

International aspects

- 32. Notes the need also to consider amendments to international agreements such as the Vienna Convention on Road Traffic and the Hague Traffic Accident Convention;
- 33. Strongly encourages international cooperation in setting regulatory standards under the auspices of the United Nations;
- 34. Points out that the restrictions and conditions laid down in the 'Dual use regulation'¹ on the trade in dual-use items – goods, software and technology that can be used for both civilian and military applications and/or can contribute to the proliferation of weapons of mass destruction – should apply to applications of robotics as well;

Final aspects

- 35. Requests the Commission to submit, on the basis of Article 225 of the Treaty on the Functioning of the European Union, a proposal for a directive on civil law rules on robotics, following the detailed recommendations set out in the annex hereto;
- 36. Confirms that the recommendations respect fundamental rights and the principle of subsidiarity;
- 37. Considers that the requested proposal will not have any financial implications;
- 38. Instructs its President to forward this resolution and the accompanying detailed recommendations to the Commission and the Council.

¹ Council Regulation (EC) No 428/2009 setting up a Community regime for the control of exports, transfer, brokering and transit of dual-use items (OJ L 341, 29.5.2009, p. 1).

ANNEX TO THE MOTION FOR A RESOLUTION: DETAILED RECOMMENDATIONS AS TO THE CONTENT OF THE PROPOSAL REQUESTED

Definition and classification of 'smart robots'

A common European definition for 'smart' autonomous robots should be established, where appropriate including definitions of its subcategories, taking into consideration the following characteristics:

The capacity to acquire autonomy through sensors and/or by exchanging data with its environment (inter-connectivity) and the analysis of those data

The capacity to learn through experience and interaction

The form of the robot's physical support

The capacity to adapt its behaviours and actions to its environment

Registration of 'smart robots'

For the purposes of traceability and in order to facilitate the implementation of further recommendations, a system of registration of advanced robots should be introduced, based on the criteria established for the classification of robots. The system of registration and the register should be Union-wide, covering the internal market, and should be managed by an EU Agency for Robotics and Artificial Intelligence.

Civil law liability

Any chosen legal solution applied to robots' liability in cases other than those of damage to property should in no way restrict the type or the extent of the damages which may be recovered, nor should it limit the forms of compensation which may be offered to the aggrieved party on the sole grounds that damage is caused by a non-human agent.

The future legislative instrument should provide for the application as a rule of strict liability to damage caused by 'smart robots', requiring only proof of a causal link between the harmful behaviour of the robot and the damage suffered by the injured party.

An obligatory insurance scheme, which could be based on the obligation of the producer to take out insurance for the autonomous robots it produces, should be established.

The insurance system should be supplemented by a fund in order to ensure that damages can be compensated for in cases where no insurance cover exists.

Interoperability, access to code and intellectual property rights

The interoperability of network-connected autonomous robots that interact with each other should be ensured. Access to the source code should be available when needed in order to investigate accidents and damage caused by 'smart robots'.

Criteria for 'intellectual creation' for copyrightable works produced by computers or robots should be drawn up.

Disclosure of use of robots and artificial intelligence by undertakings

Undertakings should be obliged to disclose:

- the number of 'smart robots' they use,
- the savings made in social security contributions through the use of robotics in place of human personnel,
- an evaluation of the amount and proportion of the revenue of the undertaking that results from the use of robotics and artificial intelligence.

Charter on Robotics

The Commission, when proposing legislation relating to robotics, should take into account the principles enshrined in the following Charter on Robotics.

CHARTER ON ROBOTICS

The proposed code of ethical conduct in the field of robotics will lay the groundwork for the identification, oversight and compliance with fundamental ethical principles from the design and development phase.

The framework must be designed in a reflective manner that allows individual adjustments to be made on a case-by-case basis in order to assess whether a given behaviour is right or wrong in a given situation and to take decisions in accordance with a pre-set hierarchy of values.

The code should not replace the need to tackle all major legal challenges in this field, but should have a complementary function. It will, rather, facilitate the ethical categorisation of robotics, strengthen the responsible innovation efforts in this field and address public concerns.

Special emphasis should be placed on the research and development phases of the relevant technological trajectory (design process, ethics review, audit controls, etc.). It should aim to address the need for compliance by researchers, practitioners, users and designers with ethical standards, but also introduce a procedure for devising a way to resolve the relevant ethical dilemmas and to allow these systems to function in an ethically responsible manner.

CODE OF ETHICAL CONDUCT FOR ROBOTICS ENGINEERS

PREAMBLE

- The Code of Conduct invites all researchers and designers to act responsibly and with absolute consideration for the need to respect the dignity, privacy and safety of humans.

- The Code asks for close cooperation among all disciplines in order to ensure that robotics research is undertaken in the European Union in a safe, ethical and effective manner.
- The Code of Conduct covers all research and development activities in the field of robotics.
- The Code of Conduct is voluntary and offers a set of general principles and guidelines for actions to be taken by all stakeholders.
- Robotics research funding bodies, research organisations, researchers and ethics committees are encouraged to consider, at the earliest stages, the future implications of the technologies or objects being researched and to develop a culture of responsibility with a view to the challenges and opportunities that may arise in the future.
- Public and private robotics research funding bodies should request that a risk assessment be performed and presented along with each submission of a proposal for funding for robotics research. Such a code should consider humans, not robots, as the responsible agents.

Researchers in the field of robotics should commit themselves to the highest ethical and professional conduct and abide by the following principles:

Benevolence – robots should act in the best interests of humans;

Non-malevolence – the doctrine of ‘first, do no harm’, whereby robots should not harm a human;

Autonomy – the capacity to make an informed, un-coerced decision about the terms of interaction with robots;

Justice – fair distribution of the benefits associated with robotics and affordability of homecare and healthcare robots in particular.

Fundamental Rights

Robotics research activities should respect fundamental rights and be conducted in the interests of the well-being of individuals and society in their design, implementation, dissemination and use. Human dignity – both physical and psychological – is always to be respected.

Precaution

Robotics research activities should be conducted in accordance with the precautionary principle, anticipating potential safety impacts of outcomes and taking due precautions, proportional to the level of protection, while encouraging progress for the benefit of society and the environment.

Inclusiveness

Robotics engineers guarantee transparency and respect for the legitimate right of access to information by all stakeholders. Inclusiveness allows for participation in decision-making processes by all stakeholders involved in or concerned by robotics research activities.

Accountability

Robotics engineers should remain accountable for the social, environmental and human health impacts that robotics may impose on present and future generations.

Safety

Robot designers should consider and respect people's physical wellbeing, safety, health and rights. A robotics engineer must preserve human wellbeing, while also respecting human rights, and disclose promptly factors that might endanger the public or the environment.

Reversibility

Reversibility, being a necessary condition of controllability, is a fundamental concept when programming robots to behave safely and reliably. A reversibility model tells the robot which actions are reversible and how to reverse them if they are. The ability to undo the last action or a sequence of actions allows users to undo undesired actions and get back to the 'good' stage of their work.

Privacy

The right to privacy must always be respected. A robotics engineer should ensure that private information is kept secure and only used appropriately. Moreover, a robotics engineer should guarantee that individuals are not personally identifiable, aside from exceptional circumstances and then only with clear, unambiguous informed consent. Human informed consent should be pursued and obtained prior to any man-machine interaction. As such, robotics designers have a responsibility to develop and follow procedures for valid consent, confidentiality, anonymity, fair treatment and due process. Designers will comply with any requests that any related data be destroyed, and removed from any datasets.

Maximising benefit and minimising harm

Researchers should seek to maximise the benefits of their work at all stages, from inception through to dissemination. Harm to research participants/human subject/an experiment, trial, or study participant or subject must be avoided. Where risks arise as an unavoidable and integral element of the research, robust risk assessment and management protocols should be developed and complied with. Normally, the risk of harm should be no greater than that encountered in ordinary life, i.e. people should not be exposed to risks greater than or additional to those to which they are exposed in their normal lifestyles. The operation of a robotics system should always be based on a thorough risk assessment process, which should be informed by the precautionary and proportionality principles.

CODE FOR RESEARCH ETHICS COMMITTEES (REC)

Principles

Independence

The ethics review process should be independent of the research itself. This principle highlights the need to avoid conflicts of interest between researchers and those reviewing the

ethics protocol, and between reviewers and organisational governance structures.

Competence

The ethics review process should be conducted by reviewers with appropriate expertise, taking into account the need for careful consideration of the range of membership and ethics-specific training of RECs.

Transparency and accountability

The review process should be accountable and open to scrutiny. RECs need to recognise their responsibilities and to be appropriately located within organisational structures that give transparency to the REC operation and procedures to maintain and review standards.

The role of a Research Ethics Committee

A REC is normally responsible for reviewing all research involving human participants conducted by individuals employed within or by the institution concerned; ensuring that ethics review is independent, competent and timely; protecting the dignity, rights and welfare of research participants; considering the safety of the researcher(s); considering the legitimate interests of other stakeholders; making informed judgements of the scientific merit of proposals; and making informed recommendations to the researcher if the proposal is found to be wanting in some respect.

The constitution of a Research Ethics Committee

A REC should normally: be multidisciplinary; include both men and women; be comprised of members with a broad experience of and expertise in the area of robotics research. The appointment mechanism should ensure that the committee members provide an appropriate balance of scientific expertise, philosophical, legal or ethical backgrounds, and lay views, and that they include at least one member with specialist knowledge in ethics, users of specialist health, education or social services where these are the focus of research activities, and individuals with specific methodological expertise relevant to the research they review; and they must be so constituted that conflicts of interest are avoided.

Monitoring

All research organisations should establish appropriate procedures to monitor the conduct of research which has received ethics approval until it is completed, and to ensure continuing review where the research design anticipates possible changes over time that might need to be addressed. Monitoring should be proportionate to the nature and degree of risk associated with the research. Where a REC considers that a monitoring report raises significant concerns about the ethical conduct of the study, it should request a full and detailed account of the research for full ethics review. Where it is judged that a study is being conducted in a way that is unethical, it should consider the withdrawal of its approval and require that the research should be suspended or discontinued.

LICENCE FOR DESIGNERS

- You should take into account the European values of dignity, freedom and justice before,

during and after the process of design, development and delivery of such technologies including the need not to harm, injure, deceive or exploit (vulnerable) users.

- You should introduce trustworthy system design principles across all aspects of a robot's operation, for both hardware and software design, and for any data processing on or off the platform for security purposes.
- You should introduce privacy by design features so as to ensure that private information is kept secure and only used appropriately.
- You should integrate obvious opt-out mechanisms (kill switches) that should be consistent with reasonable design objectives.
- You should ensure that a robot operates in a way that is in accordance with local, national and international ethical and legal principles.
- You should ensure that the robot's decision-making steps are amenable to reconstruction and traceability.
- You should ensure that maximal transparency is required in the programming of robotic systems, as well as predictability of robotic behaviour.
- You should analyse the predictability of a human-robot system by considering uncertainty in interpretation and action and possible robotic or human failures.
- You should develop tracing tools at the robot's design stage. These tools will facilitate accounting and explanation of robotic behaviour, even if limited, at the various levels intended for experts, operators and users.
- You should draw up design and evaluation protocols and join with potential users and stakeholders when evaluating the benefits and risks of robotics, including cognitive, psychological and environmental ones.
- You should ensure that robots are identifiable as robots when interacting with humans.
- You should safeguard the safety and health of those interacting and coming in touch with robotics, given that robots as products should be designed using processes which ensure their safety and security. A robotics engineer must preserve human wellbeing while also respecting human rights and may not deploy a robot without safeguarding the safety, efficacy and reversibility of the operation of the system.
- You should obtain a positive opinion from a Research Ethics Committee before testing a robot in a real environment or involving humans in its design and development procedures.

LICENCE FOR USERS

- You are permitted to make use of a robot without risk or fear of physical or psychological harm.
- You should have the right to expect a robot to perform any task for which it has been

explicitly designed.

- You should be aware that any robot may have perceptual, cognitive and actuation limitations.
- You should respect human frailty, both physical and psychological, and the emotional needs of humans.
- You should take the privacy rights of individuals into consideration, including the deactivation of video monitors during intimate procedures.
- You are not permitted to collect, use or disclose personal information without the explicit consent of the data subject.
- You are not permitted to use a robot in any way that contravenes ethical or legal principles and standards.
- You are not permitted to modify any robot to enable it to function as a weapon.

EXPLANATORY STATEMENT

Background

Under Annex VI to the Rules of Procedure, the Committee on Legal Affairs is responsible, inter alia, for civil and commercial law, company law, intellectual property law and the interpretation, application of international law, in so far as the European Union is affected, and ethical questions related to new technologies. The development of robotics and artificial intelligence raises legal and ethical issues that are clearly linked to all these areas and which require a prompt intervention at EU level. While it will be up to the Commission to eventually present one or more legislative proposals related to robotics and artificial intelligence, the European Parliament has decided to pave the way for such initiatives using its rights under Article 225 of the Treaty on the Functioning of the European Union and Rule 46 of its Rules of Procedure.

As a result, on the 20 January 2015 the JURI Committee decided to establish a Working Group (WG) on legal questions related to the development of Robotics and Artificial Intelligence (AI) in the European Union. The WG primarily aimed at drafting civil law rules linked to this subject-matter.

Besides Members of the Committee on Legal Affairs the Working Group also included Members representing the Committee on Industry, Research and Energy (ITRE), the Committee on the Internal Market and Consumer Protection (IMCO) and the Committee on Employment and Social Affairs (EMPL).

The WG consulted experts from very diverse backgrounds, receiving important contributions which are included in this resolution.

Generalities

Robotics and AI have become one of the most prominent technological trends of our century. The fast increase of their use and development brings new and difficult challenges to our society. The road from the industrial sector to the civil society environment obliges a different approach on these technologies, as robots and AI would increase their interaction with humans in very diverse fields.

The JURI Committee believes that the risks posed by these new interactions should be tackled urgently, ensuring that a set of core fundamental values is translated into every stage of contact between robots, AI and humans. In this process, special emphasis should be given to human safety, privacy, integrity, dignity and autonomy.

Other important aspects addressed in this resolution are: standardisation, intellectual property rights, data ownership, employment and liability. It is crucial that regulation provides predictable and sufficiently clear conditions to incentivise European innovation in the area of robotics and AI.

Legal basis and subsidiarity

The action by the Commission in order to adapt the existing legislation to the reality of robots and artificial intelligence should be based on Article 114 TFEU. According to Article 5 (3) TEU, the principle of subsidiarity provides that the Union shall act only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States, either at central level or at regional and local level, but can rather, by reason of the scale or effects of the proposed action, be better achieved at Union level. The development of robotics is currently happening in the entire Union. In reaction to this innovation, Member States are developing different national legislations. These discrepancies are expected to create obstacles for an effective development of robotics. Due to the fact that this technology has cross-border implications, the best legislative option is a European one.

General and ethical principles

The resolution establishes general as well as ethical principles concerning the development of robotics and AI for civil use. First, in order to properly address this development, a common definition of smart autonomous robots is fundamental. Furthermore, research in robotics and ICT as well as in the implications of their dissemination should be strengthened.

Second, in order to address the ethical principles, a Charter on Robotics is annexed to this resolution. This Charter consists of a Code of Ethical Conduct for Robotics Engineers, a Code for Research Ethics Committees and Licenses for Designers and Users. The proposed framework is in full compliance with the EU Charter of Fundamental Rights.

Moreover, the creation of a European Agency for robotics and AI is suggested. This agency should provide the necessary technical, ethical and regulatory expertise to support the relevant public actors.

Intellectual property rights, data protection and data ownership

The resolution calls on the Commission to come forward with a balanced approach to intellectual property rights when applied to hardware and software standards and codes that protect innovation and at the same time foster innovation. Moreover, the elaboration of criteria for "own intellectual creation" for copyrightable works produced by computers or robots is demanded.

The current insufficient legal framework on data protection and ownership is of great concern due to the (expected massive) flow of data arising from the use of robotics and AI.

Standardisation, safety and security

The increasing use of robots and AI requires European standardisation in order to avoid discrepancies between Member States and fragmentation of the European Union internal market.

Moreover, consumer concerns over safety and security related to the use of robots and AI need to be addressed. This resolution specifically underlines that testing robots in real-life scenarios is essential for the identification and assessment of the risks they might entail.

Rules for specific use of robots and AI

The resolution includes provisions to be applied to specific types of robots. Individual rules should be adopted for autonomous vehicles, care robots, medical robots, human repair and enhancement, as well as drones (RPAS).

Rules on Liability

Risks that may occur are inherently linked to the use of autonomous machine in our society. A robot's behaviour potentially has civil law implications, both in terms of contractual and of non-contractual liability. Thus clarification of responsibility for the actions of robots and eventually of the legal capacity and/or status of robots an AI is needed in order to ensure transparency and legal certainty for producers and consumers across the European Union.

The Commission is called on to carry out an impact assessment of its future legislative instruments to explore the implications of all possible legal solutions, such as, among others, the establishment of a compulsory insurance scheme and a compensation fund.

Robotics and AI in the social context

Increasing communication and interaction with robots have the potential to profoundly impact physical and moral relations in our society. This is especially the case for care robots towards which particularly vulnerable people can develop emotional feelings and attachment, thus causing concerns over human dignity and other moral values.

Robots and AI already influence education and employment. Against this background a close monitoring of job trends is necessary in order to avoid undesirable repercussions on the employment market.

International aspects

In view of the development of robotics and AI all over the world, consideration should be given and initiatives taken to amend existing relevant international agreements when needed or to draft new instruments with the objective of introducing specific references to robotics and AI. International cooperation in this field is very much desirable.