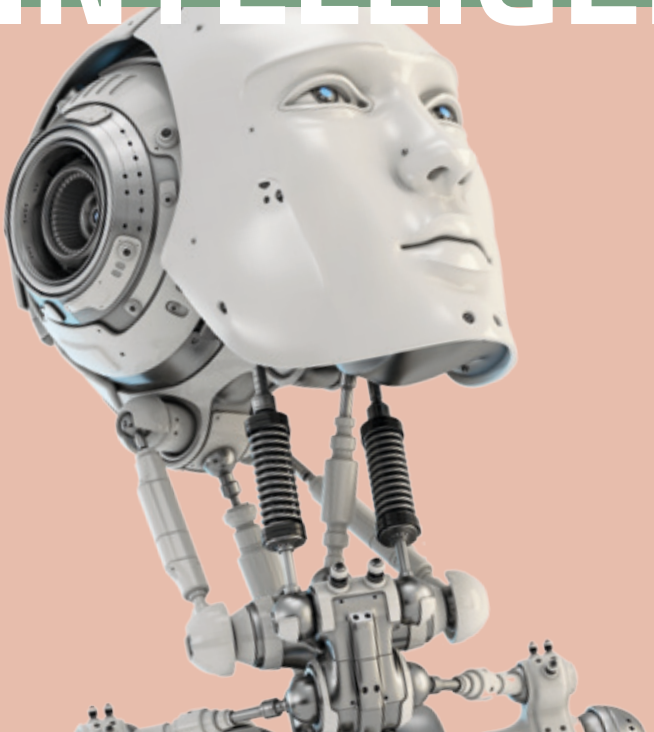
GREEN POSITIONS

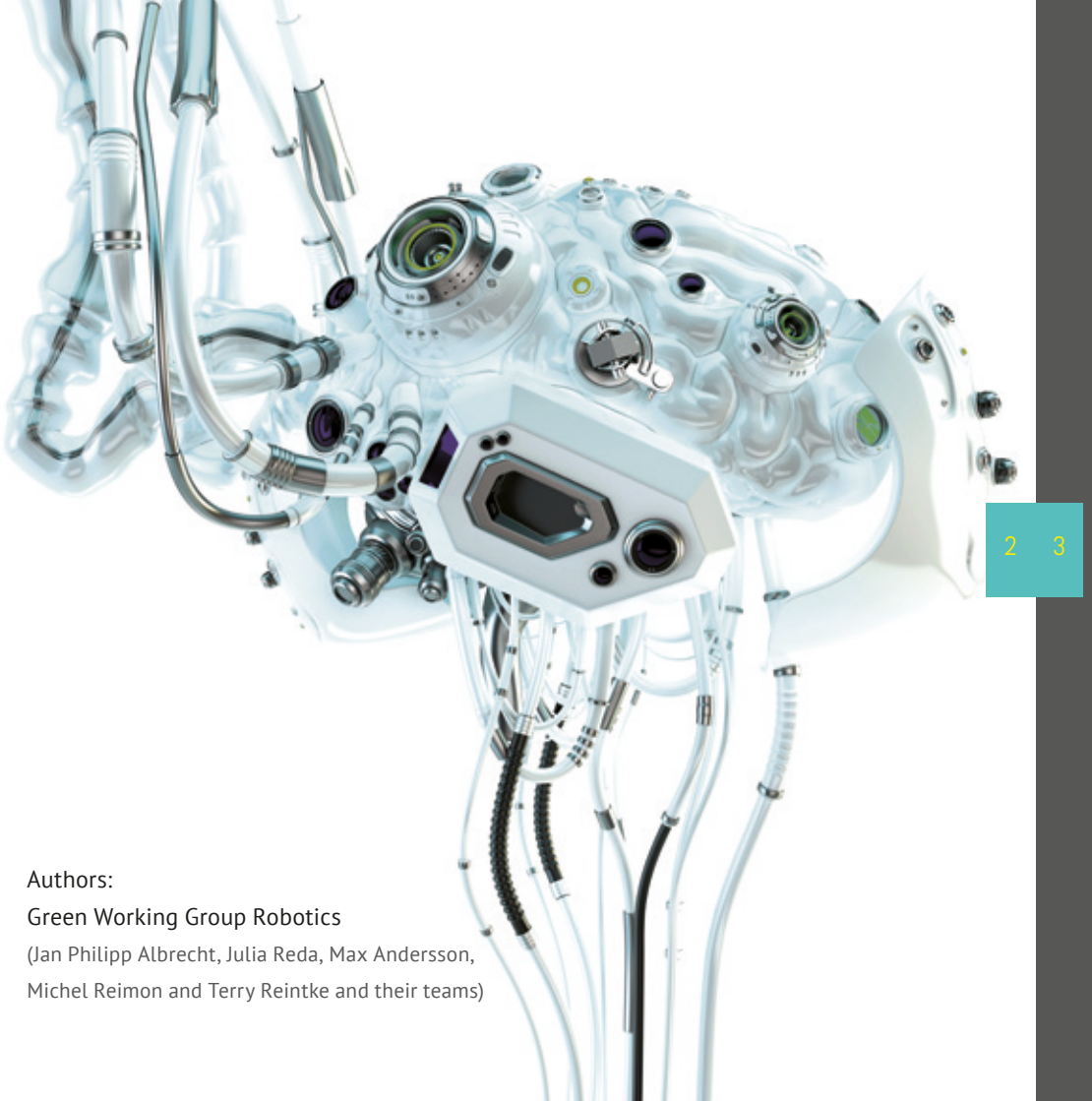
ROBOTICS AND ARTIFICIAL INTELLIGENCE



Green **DIGITAL**
Working Group

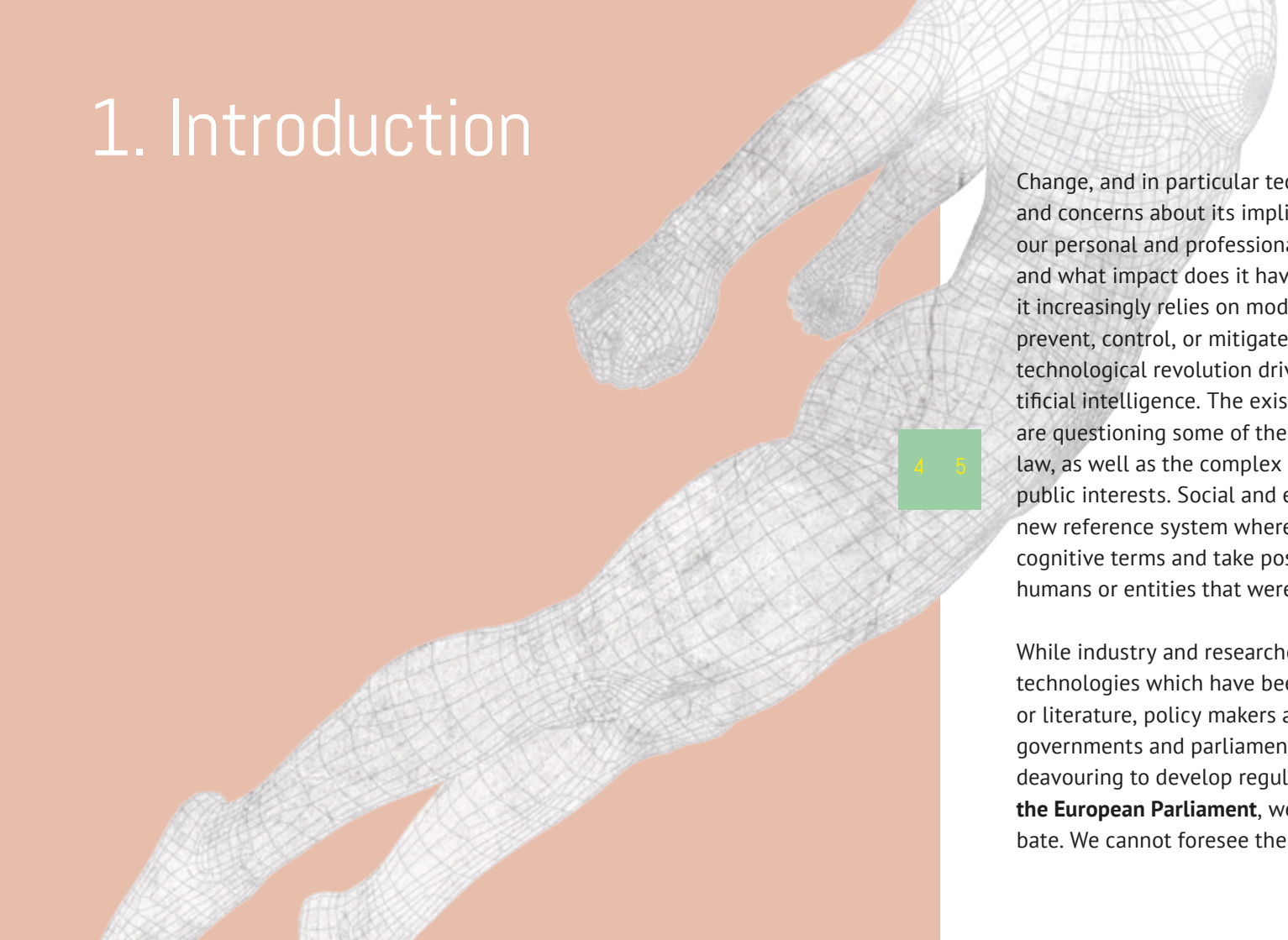
November 2016

The Greens | EFA
in the European Parliament



Authors:
Green Working Group Robotics
(Jan Philipp Albrecht, Julia Reda, Max Andersson,
Michel Reimon and Terry Reintke and their teams)

1. Introduction

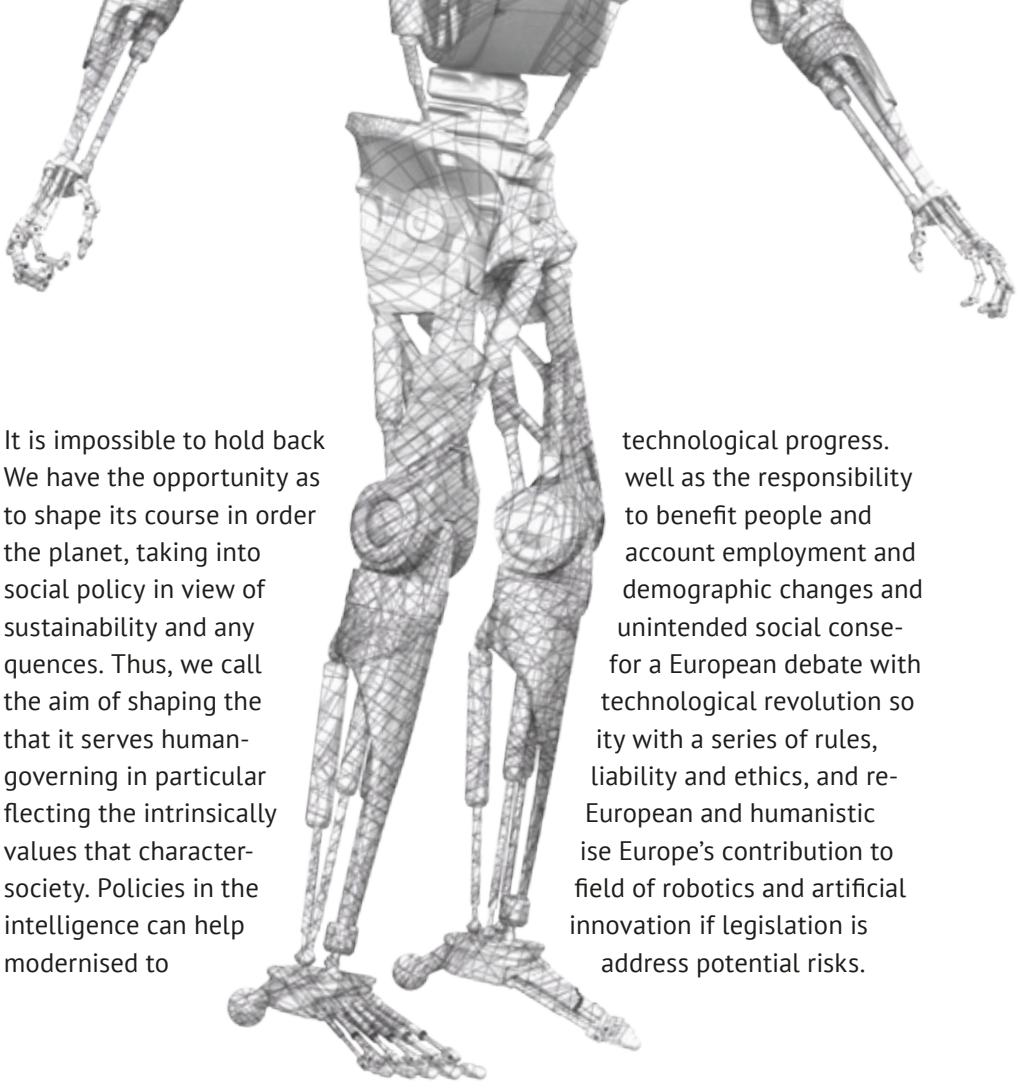


Change, and in particular technological progress, tends to provoke questions and concerns about its implications on our lives. How will technology influence our personal and professional life? What will it mean for our today's workplace and what impact does it have on the environment? Will society change when it increasingly relies on modern technology? Which safeguards are needed to prevent, control, or mitigate the impacts of technology? Today we face a new technological revolution driven by developments in the field of robotics and artificial intelligence. The existence of systems which take autonomous decisions are questioning some of the long standing principles of civil law and criminal law, as well as the complex balance between different fundamental rights and public interests. Social and ethical considerations are put into a completely new reference system where suddenly machines are able to replace humans in cognitive terms and take positions which, until today, were only expected by humans or entities that were fully controlled by and answerable to humans.

While industry and researchers are already on the way to innovations and technologies which have been thus far only seen in science fiction movies or literature, policy makers are limping behind this development. Only a few governments and parliaments are starting to gather information and endeavouring to develop regulatory frameworks. As the **Greens/EFA group in the European Parliament**, we want to play an active role in shaping this debate. We cannot foresee the future, but we can help design it in a way that

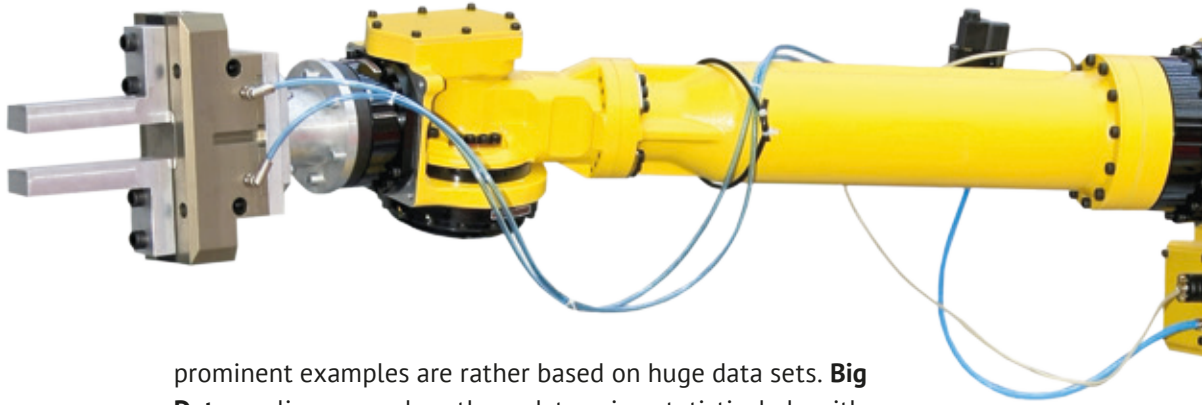
we safeguard the values of society. A first step in the right direction is to ask the right questions. How can human rights and ethical considerations be addressed in highly technological and autonomous systems? Which decisions are needed in order to influence technological evolution to the benefit of society? Where do we need renewed or new regulation to address the specific problems of robotics and artificial intelligence? Autonomous robotics blur the lines between legal subjects and objects. An autonomously acting agent raises questions of liability, rights and duties towards the existing legal categories: natural or legal persons, animals and objects. Even the possibility of creating a new legal entity with specific features is discussed.

This position paper by the **Greens/EFA Digital Working Group** serves as an initial step towards forming an opinion to help shape the debate in our political group and party family, but also inside the European Parliament and for the public debate in general. We are at a swell to an era when ever more sophisticated technology might unleash a new industrial revolution which is likely to leave no area of society untouched. To consider all its implications is a vital and complex task which will need the engagement of a vast range of stakeholders, including representatives from all different policy areas, potential users and vulnerable groups - not just those who deal with new technologies. We are convinced that the trajectory of technological development does not lie beyond our reach. Society can and should intervene in technology as it is growing. Hence, public input and an informed debate is of utmost importance; it produces change.



It is impossible to hold back technological progress. We have the opportunity as well as the responsibility to shape its course in order to benefit people and the planet, taking into account employment and social policy in view of demographic changes and sustainability and any unintended social consequences. Thus, we call for a European debate with the aim of shaping the technological revolution so that it serves human- ity with a series of rules, governing in particular liability and ethics, and reflecting the intrinsically European and humanistic values that character- ise Europe's contribution to society. Policies in the field of robotics and artificial intelligence can help innovation if legislation is modernised to address potential risks.

2. Terminologies



When trying to create a framework for future technology, the first challenge is to find a common term to encompass all varieties of current and future developments. At the same time, it is important not to regulate on one particular variety, while losing sight of the implications it may have for the other. We will list some of the currently established terms and definitions as an attempt to provide a frame of reference, while not trying to be exhaustive. **Artificial Intelligence**, automation and autonomous decision-making can exist in numerous forms that go beyond our understanding of "*robots*", "*self-driving cars*" or "*drones*".

Modern computing has taken us close to the creation of artificial intelligence (AI). Estimates differ when it can be reached, if ever, or if some recent developments should already be considered as AI. Several technologies are involved in its creation: computers, sometimes collaboratively working in computer networks of various sizes, and programs of more or less complex sets of operations called algorithms that work on data sets. While some interpret AI as something a sufficiently complex set of algorithms can produce, some of the more recent prominent examples are rather based on huge data sets. **Big Data** appliances analyse these data using statistical algorithms. Analysing their virtual environment and using databases of previous "*experiences*", **algorithms** can make decisions in unprecedented speeds, surpassing human abilities in specialised use cases today. Any regulation or standardisation applying to **autonomous systems** may thus apply to purely algorithmic systems. Examples of this can be "*High Frequency Trading*" algorithms that analyse stock and other markets in high speed and take decisions on buying and selling in large quantities. **Autonomy** is the ability of a system to operate and adapt to changing circumstances with reduced or without human control.

The resulting interaction with **virtual agents** can then, to a human being, feel almost natural, human-like. However, use cases are currently limited to certain clearly-defined scenarios such as language

processing and tasks in the field of information retrieval, such as looking up travel itineraries. **Agents** can exist with or without **physical** components. An on-line service providing you with suggestions on what to buy, based on your known previous purchases as well as the known consumption habits and preferences of other customers, does not have an immediate physical representation. A car, for example, with a certain level of *automation* could *autonomously*, that is, on the basis of its programming and the data it carries along, decide which route to take. Based on its passengers' interests, it could select a route along scenic landmarks, or based on the car's technical properties, along petrol or charging stations.

Machines exist that work closely with a biological organism such as the human body. Medical devices, such as **Cochlear implants**, use technology to create or recreate a bodily function, in this case hearing. Advocacy groups have picked up the term **Cyborg** (*cybernetic organism*) as a self-description.

In computer science, the term **agent** is used as an archetypal expression for an entity acting on behalf of another, such as a user or another program. It can be further specified using qualifying terms such as **software agent**, **intelligent agent**, or **robotic agent**. The range of what can be understood by "*robot*" is wide: we use robots in the industry for producing or manufacturing goods. These **industrial robots** are officially defined by the International Standardisation Organisation (ISO) as an automatically controlled, reprogrammable, multi-purpose manipulator. An **intelligent robot** is a mechanical device that perceives the external environment for itself, discerns circumstances and moves voluntarily.[1]

One should take into account that technology is thought up by humans. As such, it is neither bad nor good. However, there needs to be a continuous re-evaluation and critical discussion of its impact on our lives. Also, the terms **controllability**, **reversibility**, **self-learning** and **soft impacts** need to be defined and discussed when trying to create such a framework.

1 Prof. Dr. Dr. Eric Hilgendorf, Minkyu Kim, Legal Regulation of Autonomous Systems in South Korea on the Example of Robot Legislation, http://www.jura.uni-wuerzburg.de/fileadmin/_migrated/content_uploads/Legal_Regulation_of_Autonomous_Systems_in_South_Ko rea_on_the_Example_of_Robot_Legislation_-_Hilgendorf_Kim_05.pdf.

3. Principles

We demand that research and technology are integrated to the maximum benefit of all and avoid potential unintended social impacts, especially when talking about emerging technologies like robotics and artificial intelligence. It is humans who design and use robots and, thus, it is them who are the actual subjects of the law. Institutions like the Engineering and Physical Sciences Research Council (EPRSC)[2], the Arts and Humanities Research Council (AHRC) of the United Kingdom and The Council of Europe (especially in the Convention on Human Rights and Biomedicine) have developed a common set of values for the production of robots and, for the latter, set out guiding principles with regard to the application of biology and medicine. Based on this set of values, we think that those and further points can function as a moral compass for the discussion:

2 Principles of robotics – Regulating robots in the real world, September 2010, https://www.epsrc.ac.uk/research/ourportfolio/themes/engineering/activities/principlesofrobotics/.

1. Robots are multi-use tools. Robots should not be designed to kill or harm humans. The use and implementation of emerging technologies must take place according to guaranteed individual rights and fundamental freedoms and in particular human integrity (physical and mental integrity), human dignity and identity. We underline the primacy of the human being over the sole interest of science or society *(see also 3.6 Security Standards*).

2. Humans, not robots, are responsible agents. Lawmakers should make sure that the development and commercial use of emerging technologies comply with existing laws and fundamental rights, including privacy by design. The development process should follow the principles of data minimization. Whenever personal data is used, it shall be adequate, relevant and limited to what is necessary in relation to the purposes for which they are processed. For example, off-switches could be provided in the design process, collected data should not be kept for a longer period of time than necessary and less privacy-invasive technology should be considered *(see also 3.1 Ethical Standards)*.

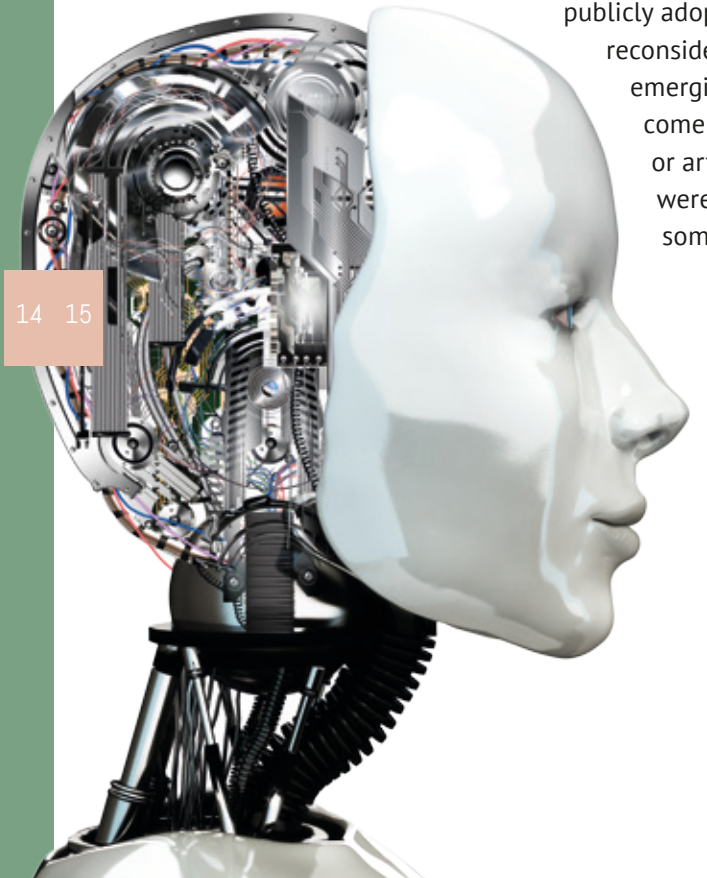
3. Robots as products should be designed to be safe, secure and fit for purpose, as other products (s*ee also 3.5 Legal liability/responsibility*).

4. Robots are manufactured artefacts. They should not be designed in a deceptive way to exploit vulnerable users; instead, their machine nature should be transparent *(see also 3.5 Legal liability/responsibility)*.

5. The person with legal responsibility for a robot should be attributed. Regarding safety and security, producers shall be held responsible despite non-liability clauses in user agreements that may exist (*see also 3.5 Legal liability/ responsibility and 3.3 Ownership over add-ons to the human body (software updates)).*

6. In accordance with responsible research and innovation, it is imperative to apply the precautionary principle and assess the long term ethical implications of new technologies in the early phase of their development. We demand respect for the autonomy of persons; the right to information (linked to the right to consent); the requirement for free and informed consent with a wide definition of "*intervention*" including preventive care, diagnosis (including invasive diagnostic acts), treatment, rehabilitation and research; protection of persons not able to consent. There are cases when interventions can only be successfully made at a time when a person is not able to consent (for example the implantation of a cochlear implant at an early age). In such cases, the decision against an intervention should not be made automatically, but the potential risks and benefits, as well as the views of parents and legal guardians should be taken into account.

Such principles give clear guidelines for developers. Concerning liabilities, existing consumer safety regimes, rules and standards (e.g. developed by ISO) should be taken into account and should be publicly adopted and developed. We think reconsidering a legal personality for emerging technologies will only become necessary if or when a robot or artificial intelligence system were to become truly self-aware at some point in the future.



3.1 Ethical Standards

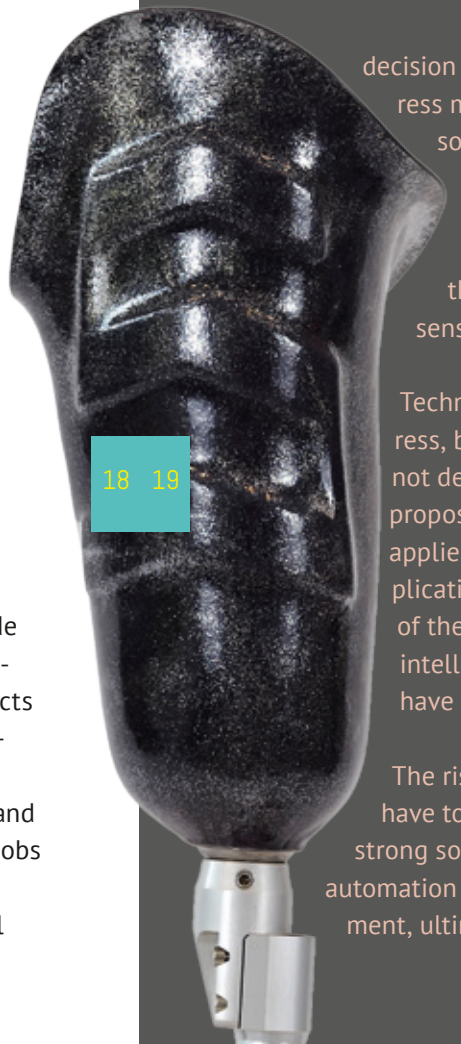
Ethicists and engineers have been contemplating "*roboethics*" and "*machine ethics*" for decades. As one of the first governments, South Korea developed a "*Robot Ethics Charter*"[3] The charter follows the "*first, do no harm*"-principle, one of the key precepts of bioethics. It states: "*The robot should obey the human being as a Friend, Helper and Partner, and should not injure human beings*". On the other hand, the charter outlines "*Manufacturer ethics*" as "*The manufacturers of robots [create robots] in order to defend the dignity of human beings, and are also responsible for robot recycling, and information protection duty*".

One important ethical question is that of the individual's control over his or her personal data. The term "*data ownership*" sometimes used in this context is quite misleading; even if one can use personal data to pay for a service, an individual should not be excluded from the control over his or her personal data. We emphasize that privacy is an inalienable human right and thus cannot be for sale or compromised. Therefore, we reject the notion of "*data ownership*" as a new form of property right. The individual should always have the right to access, correct and delete data undergoing processing. Commonly used interoperable interfaces can facilitate this process. To this end, we demand that software and its source code needs to be accessible and freely useable, at least to the owner of a device and their deputies.

3 Prof. Dr. Dr. Eric Hilgendorf, Minkyu Kim, Legal Regulation of Autonomous Systems in South Korea on the Example of Robot Legislation, (http://www.jura.uni-wuerzburg.de/fileadmin/_migrated/content_uploads/Legal_Regulation_of_Autonomous_Systems_in_South_Ko rea_on_the_Example_of_Robot_Legislation_-_Hilgendorf_Kim_05.pdf).

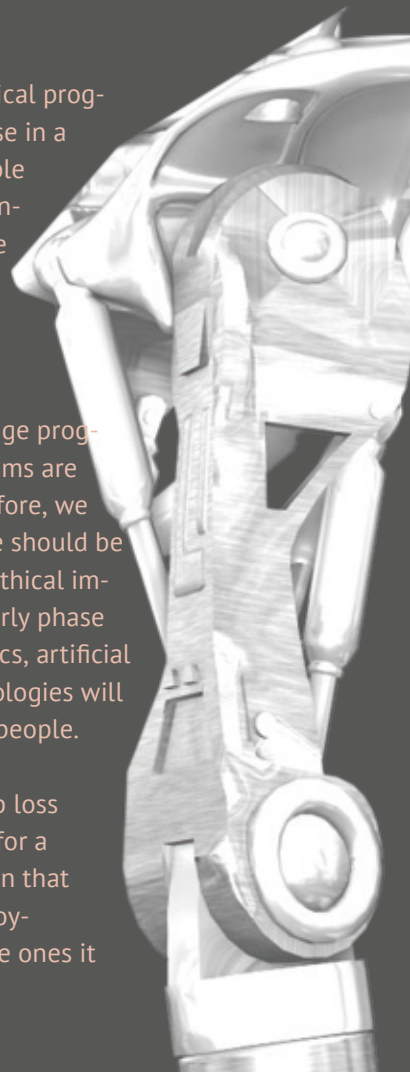
3.2 Social Standards

Technological progress has revolutionised the way people access and provide information, communicate, socialise and work. It has created new opportunities to participate in public and political discussions, opened up new prospects for an autonomous life, and resulted in enormous employment and economic potential for the European Union and beyond. There has to be a thorough assessment of the impact that robotics and artificial intelligence have had, and will continue to have, on jobs; this should include the number and types of jobs available, the quality and the competence profiles of new and existing jobs, as well as gathering information on new forms of employment. Any political decision with regard to shaping technological progress must be aimed at steering its course in a socially just, inclusive and sustainable way, at reducing inequality and ensuring that all human beings have equal opportunities to develop their talents, their skills and their sense of individuality.



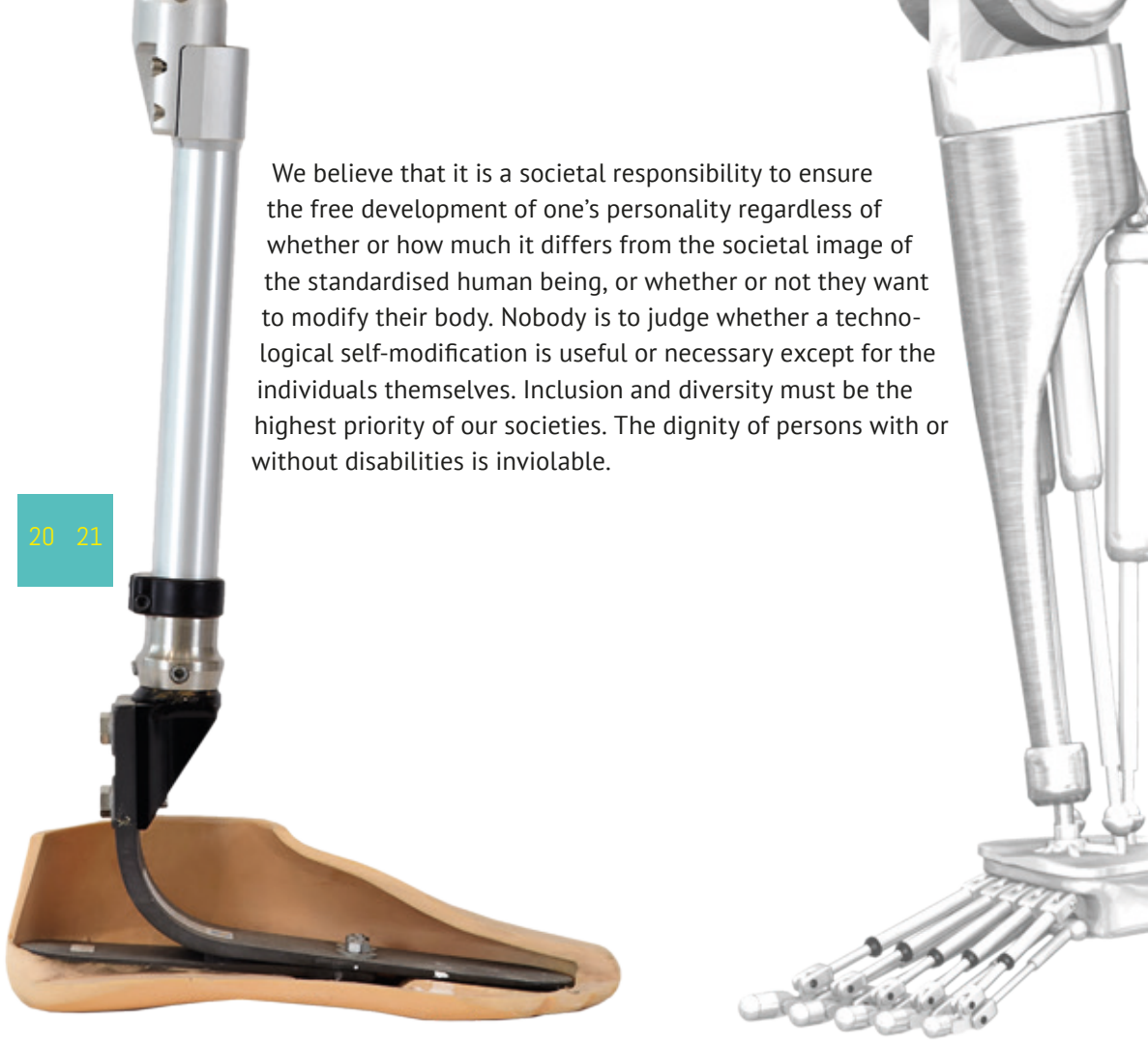
Technology in recent time has made huge progress, but the fact is that our social systems are not developed for quick changes. Therefore, we propose that the precautionary principle should be applied while we assess the long term ethical implications of new technologies in the early phase of their development. The use of robotics, artificial intelligence and other emerging technologies will have an impact on the employment of people.

The risks of economic inequality and job loss have to be addressed. There is the need for a strong social safety net. The past has shown that automation of work has led to a shift in employment, ultimately creating more jobs than the ones it



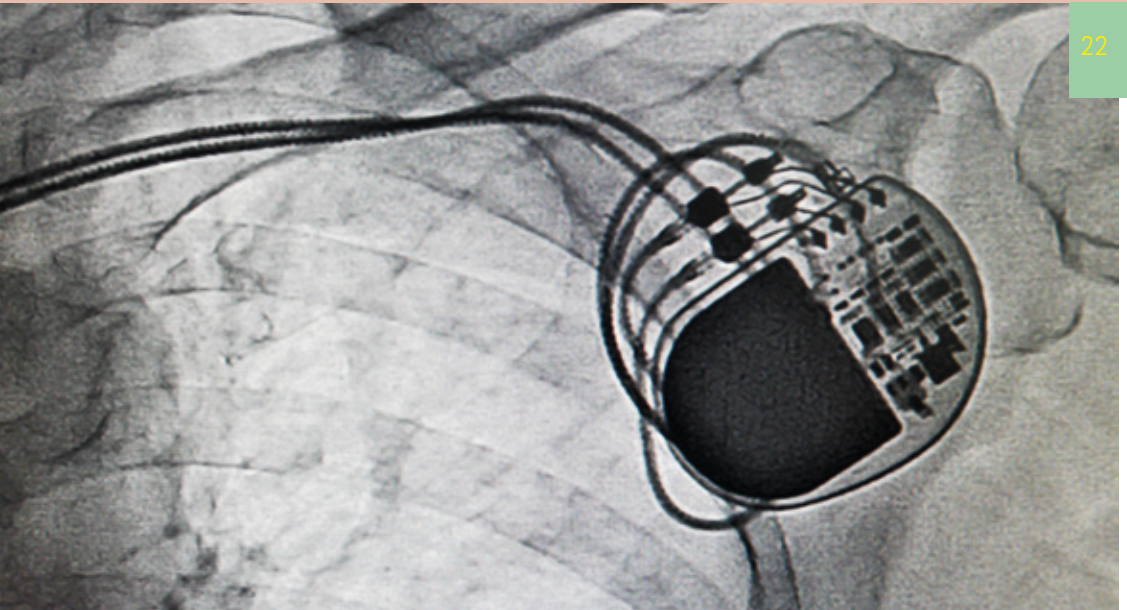
replaced and leading to the acquisition of different skills for workers. When personal computers entered offices, clerks or secretaries were not replaced. They worked with this new technology, which increased their efficiency. Moreover, new jobs were created for maintenance of those systems. On the other hand, educational and welfare systems typically react slowly. Those systems have to be modernised and made more flexible. Thus, we call for employers to help workers acquire new skills and make education and training a core issue to absorb potential shocks on the job market. We ask for recognition of the benefits that robotics and artificial intelligence may have on the job market by replacing degrading and dangerous jobs.

We believe that the provision of social services or health services shall not be made dependent on the acceptance of robotics and artificial intelligence serving, for example, as an implant or extension to a human body. The individual's decision to reject an implant, prosthesis or extension to their body must never lead to unfavourable treatment or threats with regard to employment, education, health care, social security or other benefits. A person that has the possibility to carry such an extension shall have the right to uninstall it or reject it without any negative consequences.



We believe that it is a societal responsibility to ensure the free development of one's personality regardless of whether or how much it differs from the societal image of the standardised human being, or whether or not they want to modify their body. Nobody is to judge whether a technological self-modification is useful or necessary except for the individuals themselves. Inclusion and diversity must be the highest priority of our societies. The dignity of persons with or without disabilities is inviolable.

3.3 Ownership over add-ons to the human body (software updates)



Every person should have a right to receive the best possible medical treatment, with respect to their wishes. This should also apply in the case of developments in advanced medical prostheses and implants. Such devices should work to the benefit of the person carrying them and never reduce their autonomy or self-determination. The person carrying such devices is to be considered the full owner of the respective device and all its components, including software source code. Only if a person can fully understand the workings of the device and modify – to the extent that does not produce a malfunction – its functioning, they can be fully capable of deciding their faith. Enhancements can be fundamental to a person and therefore should not be taken away for purposes of seizure. In particular, devices that serve a medical purpose should be considered analogous to body parts and hence not be available for impoundment or pressuring.

Advanced medical devices are usually highly specialised. Modifying or reprogramming them requires extensive knowledge of the device's design, as well as access to specialised programming devices, for example, to communicate with the medical device in order to install fixes. This also requires medical and technical expertise. That is why we suggest the creation of trusted, independent entities capable of providing such care. Manufacturers should, to this end, be obliged to supply these independent entities with comprehensive design instructions, as well as the program source code, similar to provisions requiring the deposit of publications to national libraries. We call for a revision and modification of copyright and other related norms to allow for these goals.

We believe that individuals carrying/having installed a robotic or artificial intelligence system are entitled to access its inner workings and have the right to access its source code for the purposes of enhancing and troubleshooting. Given the - possibly unprecedentedly far-reaching - risks inherent to software coding impacting citizens' future lives and body integrity, the exclusive rights on computer programs should be subject to reinforced exceptions (such as reverse engineering, not to be overridden by contract) taking into account the specific risk of these AI programs, be it present, imminent or potential. Algorithms not protected by copyright but protected otherwise, e.g. by trade-secrets, should be subject to the same possibility of reverse-engineering. We call for a revision and modification of the copyright rules and other exclusive rights norms in order to explicitly allow this.

3.4 Environmental responsibility

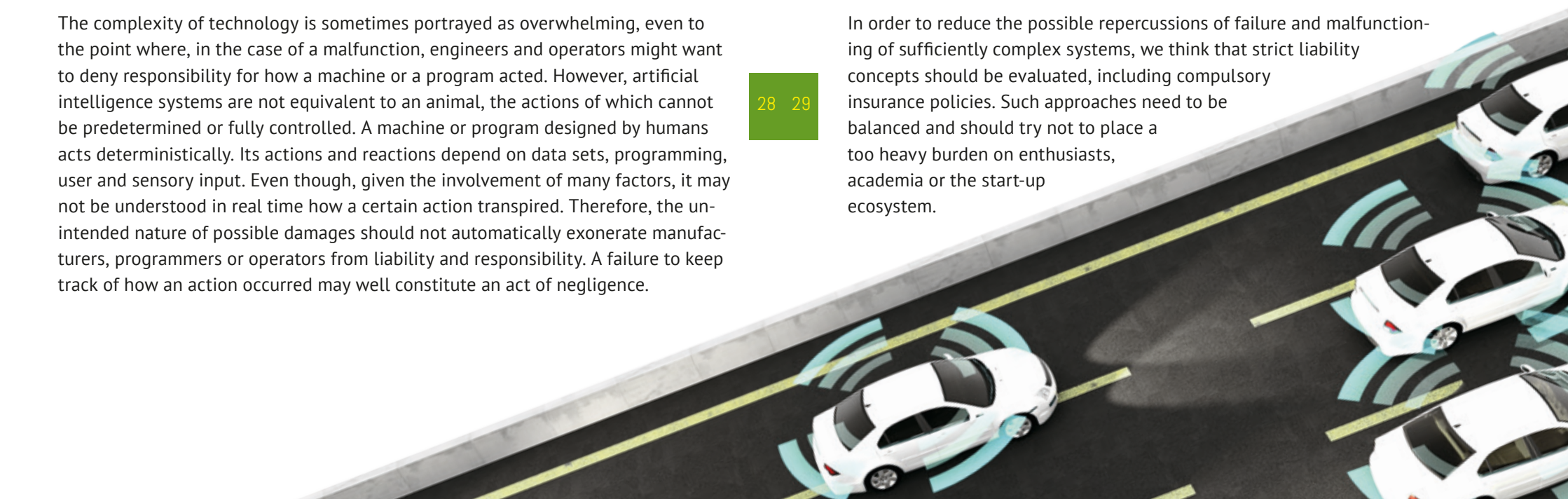
As the development of robotics may also increase the usage of energy and resources, there will be a need to minimise the ecological footprint of robotics. We think that the principles of regenerative design are vital for future developments. We call for an increase in energy efficiency by promoting the use of renewable technologies for robotics, the use and reuse of secondary raw materials and the reduction of waste.

Whether robotics and artificial intelligence have a positive or negative impact on the environment is still to be discussed. There are several indications that positive gains might be found. One example is in agriculture, where robotics and AI are already helping to create more efficient and sustainable systems. The “Internet of Things” is making agricultural processes more precise, adapting them to the current climate, making it more efficient and even helping to exchange the use of pesticides for more controlled farming practices. All of this helps to feed a growing population more reliably and healthily. Robotics and artificial intelligence can also benefit the environment through the efficient management of diseases, of factory production lines and of public transportation (including individual transport, such as cars). Therefore, we underline that the possible positive gains that robotics and AI could have on the environment should not be dismissed, but rather taken seriously in the fight against climate change.

3.5 Legal liability/responsibility

The complexity of technology is sometimes portrayed as overwhelming, even to the point where, in the case of a malfunction, engineers and operators might want to deny responsibility for how a machine or a program acted. However, artificial intelligence systems are not equivalent to an animal, the actions of which cannot be predetermined or fully controlled. A machine or program designed by humans acts deterministically. Its actions and reactions depend on data sets, programming, user and sensory input. Even though, given the involvement of many factors, it may not be understood in real time how a certain action transpired. Therefore, the unintended nature of possible damages should not automatically exonerate manufacturers, programmers or operators from liability and responsibility. A failure to keep track of how an action occurred may well constitute an act of negligence.

In order to reduce the possible repercussions of failure and malfunctioning of sufficiently complex systems, we think that strict liability concepts should be evaluated, including compulsory insurance policies. Such approaches need to be balanced and should try not to place a too heavy burden on enthusiasts, academia or the start-up ecosystem.



3.6 Security Standards

IT security in classical IT systems is already a much discussed and relatively well-regulated area. However, when it comes to the application of IT in non-traditional fields, such as individual mobility, health and implants, or even something as mundane as a baby phone, we find that the level of scrutiny pales in comparison to IT usage in the banking or communication sectors, both with regards to the depth of the public conversation around these issues and, moreover, in actual legislation and administration. We therefore propose that robots and artificial intelligence should be developed and produced based on an impact assessment, to the best available technical standards regarding security and with the possibility to intervene.

These requirements should be applied where they are reasonable, such that the development and use of algorithms and robotics for smaller companies, research and private use are not impeded. An impact assessment could be required only when a certain threshold of persons affected is reached, such as

for mass and heavy industrial production. Furthermore, the scope of that impact assessment needs to be developed, with different scopes – including different levels of stringency – for different actors and different projects. Even a teenager assembling a robot using a microcontroller build kit and Lego pieces will make a small impact assessment on the construction of the robot in their head. This does not need to be strictly formalized, but we need to be sure that future legislative proposals do not outlaw enthusiast projects like this.

In any case, impact assessments should not be left solely to private actors. The European Union and its Member States should fund research to that end, and, in particular, with regards to the ethical and legal effects of artificial intelligence. A European robotics agency should supervise the developments and make proposals and guidelines for developers, producers and controllers of automatic machines.

Automated vehicles could provide for significant improvements in terms of safety in traffic and transportation, as, currently, a high number of accidents are the result of human error. In order to do so, an automated vehicle will have to constantly re-evaluate traffic flows and, possibly, their management. The resulting data will need to be transmitted securely and in real time. As soon as there is a significant number of autonomous vehicles operating, our city planning, zoning and transport planning laws and regulations need to be revised according to the changed situation. One suggestion could be to have special zones prohib-

iting pedestrians to enter, such as high-speed highways, metro tunnels or train tracks, where liability is somewhat limited for manufacturers and the operators of autonomous vehicles. Transport modes for which traffic control is already well established, such as public transport, must get the most attention when it comes to promoting autonomous driving.

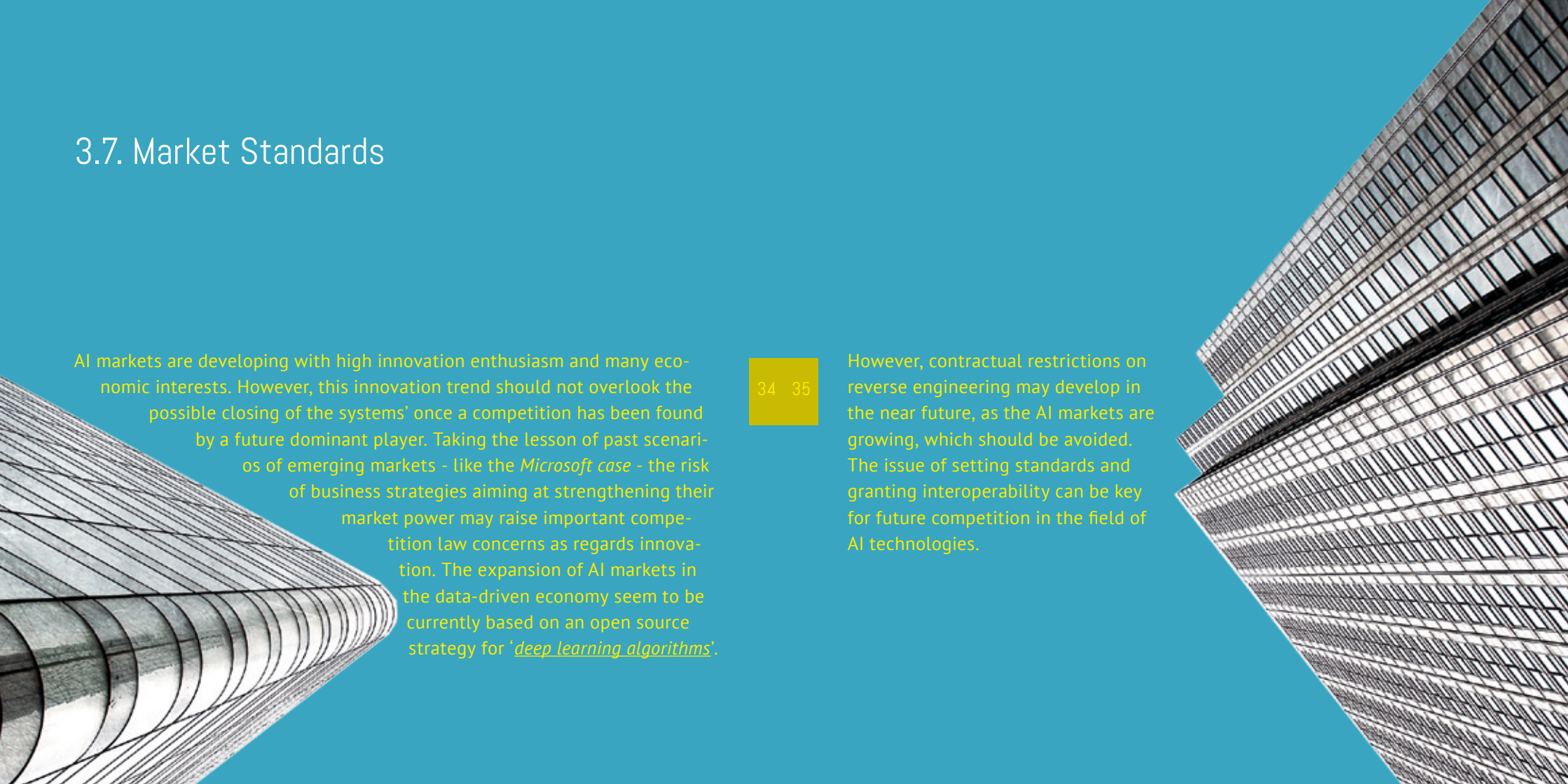
With regard to ongoing ethical debates, autonomous passenger cars operating in mixed traffic should be designed in such a way that they cannot be moving too quickly or recklessly, thereby avoiding any situation where they cannot come to a halt and endanger the health of both passengers and bystanders. Autonomous vehicles should be able to operate safely when relying only on data their own sensory systems create, basing decisions primarily on this and only taking data from other sources into account secondarily.

As far as the usage of robotics and artificial intelligence in combat situation goes, we are strongly of the opinion that the decision to harm or kill a human being should only be made by a well-trained human operator. Thus, the use of robots in the military should not remove responsibility and accountability from a human. The deployments of robots and artificial intelligence should be in accordance with international humanitarian law and laws concerning armed conflicts.

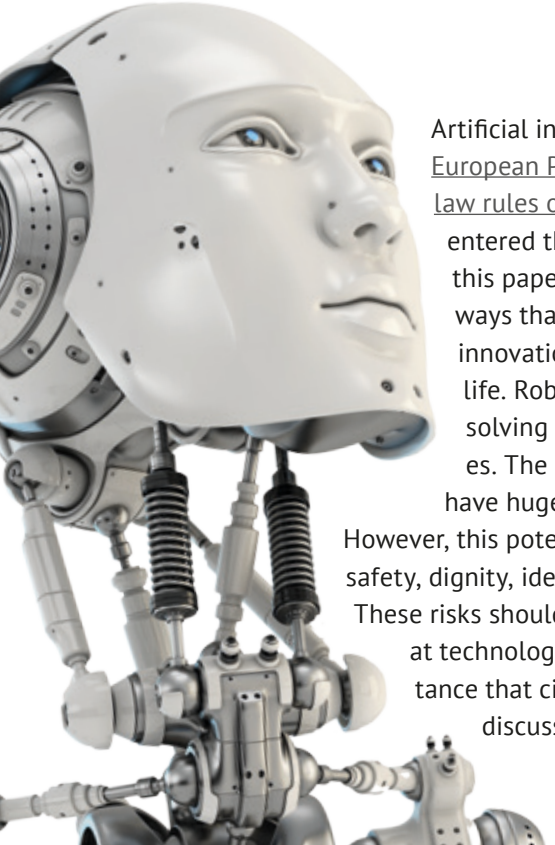
3.7. Market Standards

AI markets are developing with high innovation enthusiasm and many economic interests. However, this innovation trend should not overlook the possible closing of the systems' once a competition has been found by a future dominant player. Taking the lesson of past scenarios of emerging markets - like the *Microsoft case* - the risk of business strategies aiming at strengthening their market power may raise important competition law concerns as regards innovation. The expansion of AI markets in the data-driven economy seem to be currently based on an open source strategy for '*deep learning algorithms*'.

However, contractual restrictions on reverse engineering may develop in the near future, as the AI markets are growing, which should be avoided. The issue of setting standards and granting interoperability can be key for future competition in the field of AI technologies.



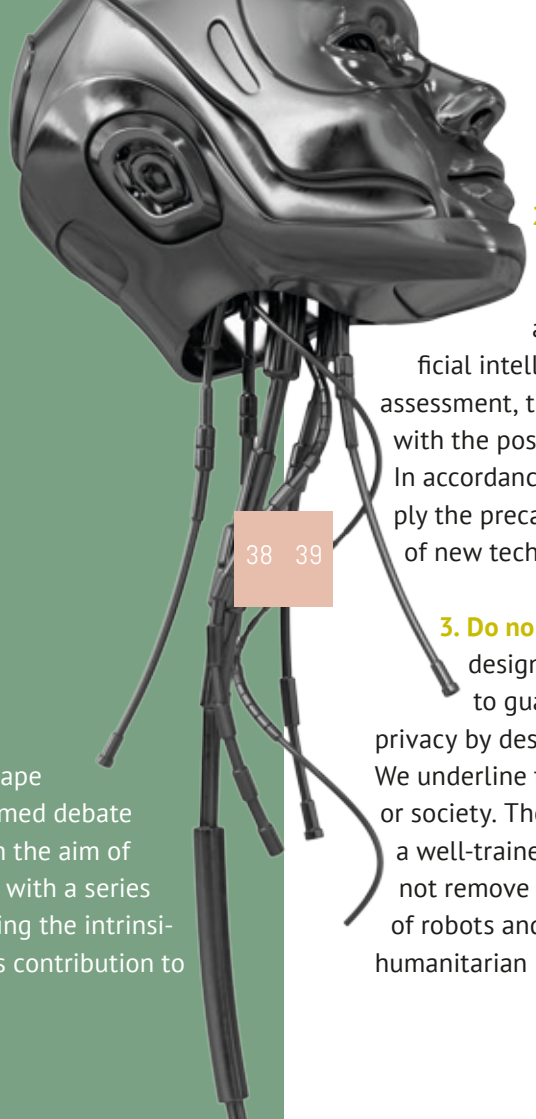
4. Conclusion



Artificial intelligence and robotics are a reality. The European Parliament's own-initiative report on Civil law rules on robotics demonstrates how this issue entered the political arena. The examples cited in this paper only scratch the surface of the many ways that emerging technologies are driving innovation and might transform our everyday life. Robotics and AI can be major drivers for solving some of the world's biggest challenges. The promise of emerging technologies is to have huge transformative effects to many sectors. However, this potential is accompanied by risks for human safety, dignity, identity, privacy, integrity and autonomy. These risks should remain in our focus while looking at technological trends. It is of the utmost importance that citizens are actively involved in those discussions. Policymakers should respond to legitimate concerns and foster a dialogue between civil society, industry and politics. Only through an informed debate can attention be drawn to the potential risks and benefits of emerging technologies and permit society to intervene in technology as it is growing.

Developing a position in our political family and a proper consideration of the issue will provide sound foundations for these technological developments. We promote an innovation-friendly policy on emerging technologies that takes into account the need to modernise legislation to address risks adequately and develops new European guidelines to ensure a joint approach in robotics and artificial intelligence. The process has to be accompanied by ethical standards addressing the needs and dilemmas of researchers, practitioners, users and designers. An important point in this regard is to empower people while acquiring the relevant skills they need in our technology driven world. Instead of allowing alarmists to dominate the debate and delay progress, we should remain focused on the development of appropriate laws on emerging technologies to make use of their benefits.

5. Recommendations Green position on Robotics and Artificial Intelligence



1. An informed public debate. Society should be able to help shape technology as it is developing. Hence, public input and an informed debate is of the utmost importance. We call for a European debate with the aim of shaping the technological revolution so that it serves humanity with a series of rules, governing, in particular, liability and ethics and reflecting the intrinsically European and humanistic values that characterise Europe's contribution to society.

2. Precautionary principle. We demand that research and technology are integrated to the maximum benefit of all and potential unintended social impacts are avoided, especially when talking about emerging technologies. We propose that robots and artificial intelligence should be developed and produced based on an impact assessment, to the best available technical standards regarding security and with the possibility to intervene.

In accordance with responsible research and innovation, it is imperative to apply the precautionary principle and assess the long term ethical implications of new technologies in the early phase of their development.

3. Do no harm-principle. Robots are multi-use tools. They should not be designed to kill or harm humans. Their use must take place according to guaranteed individual rights and fundamental rights, including privacy by design and in particular human integrity, human dignity and identity. We underline the primacy of the human being over the sole interest of science or society. The decision to harm or kill a human being should only be made by a well-trained human operator. Thus, the use of robots in the military should not remove responsibility and accountability from a human. The deployments of robots and artificial intelligence should be in accordance with international humanitarian law and laws concerning armed conflicts.

4. Ecological footprint. We acknowledge robotics and artificial intelligence can help shape processes in a more environmentally friendly way while at the same time emphasising the need to minimise their ecological footprint. We emphasise the need to apply the principles of regenerative design, increase energy efficiency by promoting the use of renewable technologies for robotics, the use and reuse of secondary raw materials, and the reduction of waste.

5. Enhancements. We believe that the provision of social or health services should not depend on the acceptance of robotics and artificial intelligence as implants or extensions to the human body. Inclusion and diversity must be the highest priority of our societies. The dignity of persons with or without disabilities is inviolable. Persons carrying devices as implants or extensions can only live self-determinedly if they are the full owner of the respective device and all its components, including the possibility to reshape its inner workings.

6. Autonomy of persons. We believe a person's autonomy can only be fully respected when their right to information and consent are protected, including the protection of persons who not able to consent. We reject the notion of "data ownership", which would run counter to data protection as a fundamental right and treat data as a tradable commodity.

7. Clear liabilities. Legal responsibility should be attributed to a person. Regarding safety and security, producers shall be held responsible despite any existing non-liability clauses in user agreements. The unintended nature of possible damages should not automatically exonerate manufacturers, programmers or operators from their liability and responsibility. In order to reduce possible repercussions of failure and malfunctioning of sufficiently complex systems, we think that strict liability concepts should be evaluated, including compulsory insurance policies.

8. Open environment. We promote an open environment, from open standards and innovative licensing models, to open platforms and transparency, in order to avoid vendor lock-in that restrains interoperability.

9. Product safety. Robotics and artificial intelligence as products should be designed to be safe, secure and fit for purpose, as with other products. Robots and AI should not exploit vulnerable users.

10. Funding. The European Union and its Member States should fund research to that end in particular with regards to the ethical and legal effects of artificial intelligence.

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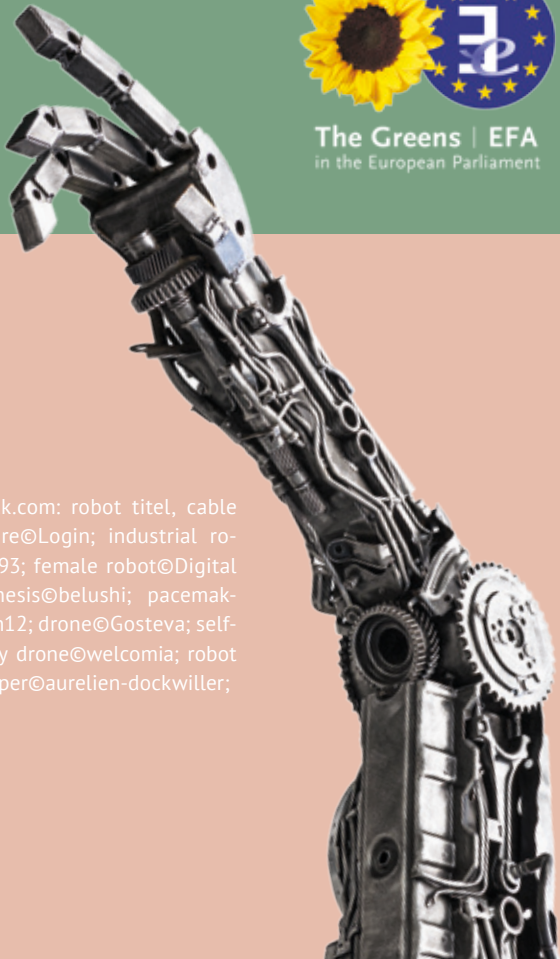

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