COMPARATIVE HANDBOOK: ROBOTIC TECHNOLOGIES LAW

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Handbook

7. ROBOT LAW – Greece Chapter

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7.1. Technical Framework

According to Hod Lipson, an engineering professor at Columbia University, as more and more computer-guided automation is creeping into everything, from manufacturing to decision making, in the future machines and software will possess abilities that were unthinkable until recently.[276] Others, like Ray Kurzweil,[277] a computer scientist and inventor, refer to "*singularity*", meaning the (hypothetical) moment in the future, when machines will have *recursive self-improvement* skills and artificial (super)intelligence, which will far exceed human intellectual capacity and control.

7.1.1. State of Art

2015 had been an exciting year in robotics.[278] We saw robots appear in all sorts of new commercial settings and roles, from shopping assistants to hospital helpers and hotel concierges; it was also a year of important developments in automated driving technology. 2016 is expected to be even more exciting.[279] China, which has been investing heavily in robot technology, wants to replace millions of workers with advanced and cost-efficient robots. Developments in robot learning will enable robots to teach and train each other. Robotic home companions and helpers and social robots will extend their presence in the market and eventually in households. Rapid developments in the smart and autonomous drones field are expected, as regulation and technology will enable registration of drones and air traffic control.

7.1.2. A Legal Challenge

The European Commission, having identified the increasingly significant and crucial role of robot for society and economy (e.g. in the fields of healthcare, home care, security, agriculture, environment, transportation, entertainment, etc.)[280], recently funded RoboLaw ("Regulating Emerging Robotic Technologies in Europe: Robotics facing Law and Ethics"), a project with the

276. D. Rotman, '*Who Will Own the Robots?*', MIT Technology Review, vol. 118, no 4, 2015, p. 26.
277. R. Kurzweil, *The Singularity Is Near: When Humans Transcend Biology*, Penguin Books, 2005.
278. W. Knight, '*What Robots and AI Learned in 2015*', MIT Technology Review, 2015, http://www.technologyreview.com/news/544901/what-robots-and-ai-learned-in-2015
279. W. Knight, '*What We Expect to See in Robotics and Artificial Intelligence in 2016*', MIT Technology Review, 2016, http://www.technologyreview.com/news/545056/5-robot-trends-to-watch-for-in-2016
280. European Commission, '*What robots can do for you*', 2014, http://europa.eu/rapid/press-release_MEMO-14-386_en.htm

objective to analyse the ethical and legal issues raised by robotic application, suggest whether new regulation is needed and further provide regulators with guidelines to deal with them. The conclusions of the project are included in a report titled “Guidelines on Regulating Robotics”, published in 2014.[281]

Ryan Calo, an assistant professor at the University of Washington School of Law, points out[282] that “robotic systems accomplish tasks that cannot be anticipated in advance and robots increasingly blur the line between person and instrument”.[283] As robots obtain greater sophistication and decision-making capabilities, our social and legal perceptions are challenged. This analysis will attempt to offer an introductory approach to today’s robot technology and its interaction with current legal framework and legal expectations.

7.1.3. Definitions

7.1.3.1. Robot

Noting that there is currently no universal definition of *robot*,[284] reference is made to ISO 8373: 2012; the said International Standard includes vocabulary used in relation with robots and robotic devices operating in both industrial and non-industrial environments.

Robot is defined as actuated mechanism programmable in two or more axes[285] with a degree of autonomy,[286] moving within its environment, to perform intended tasks.[287] *Industrial robot* is further defined as automatically controlled, reprogrammable, multipurpose manipulator,[288] programmable in three or more axes, which can be either fixed in place or mobile for use in industrial automation applications, and *service robot* is defined as *robot* that performs useful tasks for humans or equipment excluding industrial automation applications. *Intelligent robot* is defined as *robot* capable of performing tasks by sensing its environment and/or interacting with external sources and adapting its behaviour.

7.1.3.2. Types of Robots

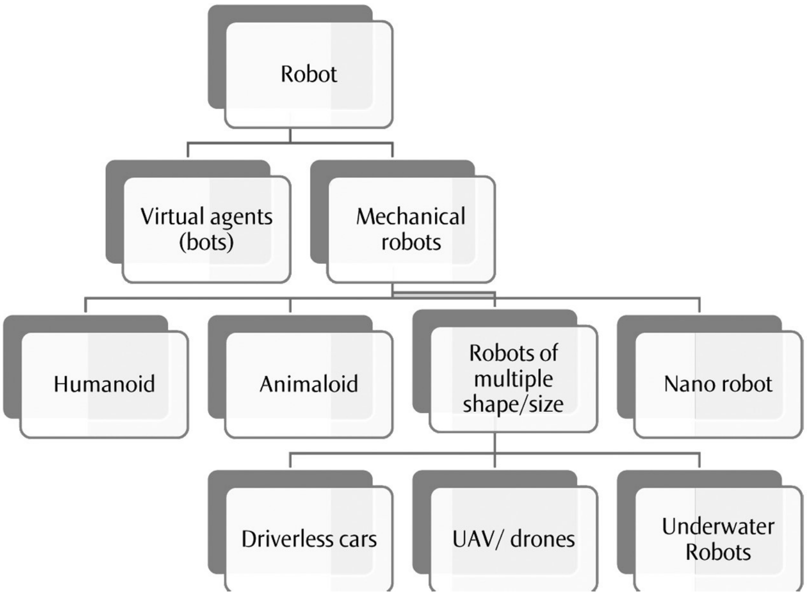
The term *robot* can basically refer to both physical (mechanical) robots and virtual agents (bots, avatars). Robots can generally be distinguished by their appearance (e.g. humanoids, animaloids), by application (e.g. industrial, domestic, military, medical, entertainment), by shape/

281. E. Palmerini *et al.*, *‘Guidelines on Regulating Robotics’*, Scuola Superiore Sant’ Anna, 2014, http://www.robolaw.eu/RoboLaw_files/documents/robolaw_d6.2_guidelinesregulatingrobotics_20140922.pdf
282. R. Calo, *‘Robotics and the Lessons of Cyberlaw’*, California Law Review, vol. 103, no 3, 2015, p. 3, http://ssrn.com/abstract=2402972
283. Calo, p. 532, calls this feature “emergence”.
284. On the definition of robot *see inter alia*: A. Bertolini, *‘Robots as Products: The Case for a Realistic Analysis of Robotic Applications and Liability Rules’*, Law Innovation and Technology, vol. 5, no 2, 2013, 214-247, p. 217
285. The number of axes: two axes are required to reach any point in a plane; three axes are required to reach any point in space. To fully control the orientation of the end of the arm (i.e. the wrist) three more axes (yaw, pitch and roll) are required. *See* Wikipedia, The Free Encyclopedia, *‘Industrial Robot’*, https://en.wikipedia.org/wiki/Industrial_robot
286. Ability to perform intended tasks based on current state and sensing, without human intervention.
287. ISO 8373:2012, Robots and robotic devices – Vocabulary, http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=55890
288. Machine in which the mechanism usually consists of a series of segments, jointed or sliding relative to one another, for the purpose of grasping and/or moving objects (pieces or tools) usually in several degrees of freedom.

size and locomotion (e.g. legged/wheeled robots, nano robots) and by operating environment (e.g. UAV/ drones, space robots, underwater robots).

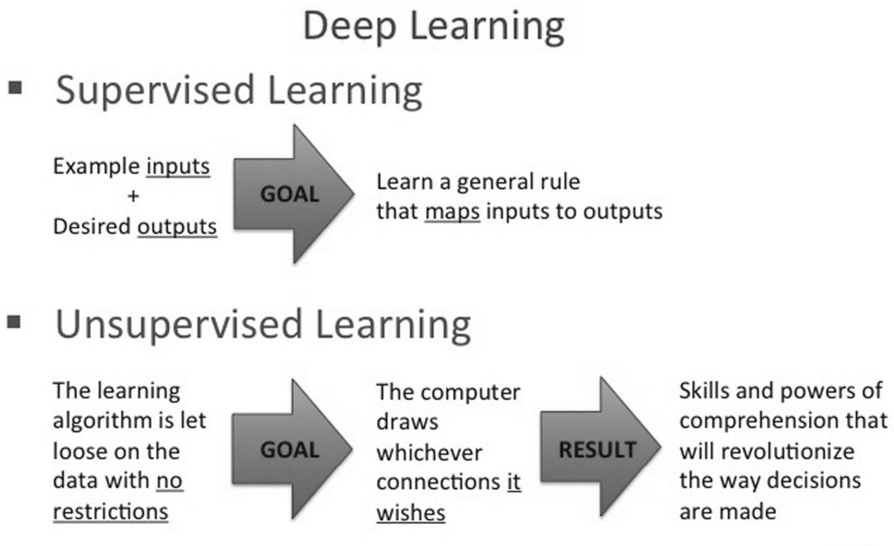
7.1.3.3. Artificial Intelligence

Artificial Intelligence (AI) is arguably the most exciting field and essentially the most important underlying technology in robotics.



The current developments in the AI field are largely related with "deep learning", a new area of "machine learning", in which computer systems learn from experience and thus improve their performance over time, taking in data from all sorts of available sources (from research reports to YouTube videos and tweets), using algorithms that have the ability to "learn".[289] A broad categorization of machine learning tasks distinguishes between "supervised learning", where computers are given example inputs and their desired outputs and the goal is to learn a general rule that maps inputs to outputs,[290] and "unsupervised learning", which is true intelligence, "where the learning algorithm is let loose on the data with no restrictions and permitted to draw whichever connections it wishes".[291]

289. H. Surden, '*Machine Learning and Law*', Washington Law Review, vol. 89, no 1, 2014, p. 88, http://ssrn.com/abstract=2417415; T. Simonite, '*Teaching Machines to Understand Us*', MIT Technology Review, vol. 118, no 5, 2015, pp. 71-77, http://www.technologyreview.com/featuredstory/540001/teaching-machines-to-understand-us/
290. Wikipedia, The Free Encyclopedia, *'Machine Learning'*, http://en.wikipedia.org/wiki/Machine_learning
291. E.J. Zimmerman, *'Machine Minds: Frontiers in Legal Personhood'*, SSRN, 12 February 2015, p. 11, http://ssrn.com/abstract=2563965 or http://dx.doi.org/10.2139/ssrn.2563965



Given the practically unlimited information resources currently available (including Big Data), along with the constantly improving computing power (considering also the emergence of quantum computing[292]), it is fair to predict that machines using "unsupervised learning" will soon develop skills and powers of comprehension that will revolutionize the way decisions are made.

7.1.4. Standards on Robots

The International Organization for Standardization (ISO) and the European Committee for Standardization (CEN), both of which Greece is a member, have introduced standards related with robot technologies. The said standards include specifications for robotic products, services and systems, to ensure quality, safety and efficiency.

The ISO/CEN Standards are further adopted by the Hellenic Organization for Standardization (ELOT). Please note that such (adopted) Standards are nonbinding and are followed on a voluntary basis, as long as they are not included in some form of legislation.

7.1.4.1. ISO

International Standards for robots currently adopted by the ISO include *inter alia*:

- **ISO 8373:2012**: Robots and robotic devices – Vocabulary
- **ISO 10218-2:2011**: Robots and robotic devices – Safety requirements for industrial robots – Part 2: Robot systems and integration;
- **ISO 9409-1:2004**: Manipulating industrial robots – Mechanical interfaces – Part 1: Plates;
- **ISO 10218-1:2011**: Robots and robotic devices – Safety requirements for industrial robots – Part 1: Robots;

292. P. RINCON, '*Step forward for quantum computing*', BBC News, 2015, http://www.bbc.com/news/science-environment-32534763

- **ISO 13482:2014**: Robots and robotic devices – Safety requirements for personal care robots;
- **ISO 9787:2013**: Robots and robotic devices – Coordinate systems and motion nomenclatures;
- **ISO 9283:1998**: Manipulating industrial robots – Performance criteria and related test methods;
- **ISO 12100:2010**: Safety of machinery – General principles for design – Risk assessment and risk reduction;
- **ISO 13849-1:2015**: Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design;
- **ISO 13850:2015**: Safety of machinery – Emergency stop function – Principles for design;
- **ISO 9787:2013**: Robots and robotic devices – Coordinate systems and motion nomenclatures.

International Standards currently under development include *inter alia*:

- **ISO/DIS 18646-1**: Robots and robotic devices – Performance criteria and related test methods for service robot – Part 1: Locomotion for wheeled robots;
- **ISO/WD 18646-2**: Robots and robotic devices – Performance criteria and related test methods for service robot – Part 2: Navigation;
- **ISO/NP TR 20218-1**: Robots and robotic devices – Safety requirements for industrial robots – Part 1: Industrial robot system end of arm tooling (end-effector);
- **ISO/NP 20218-2**: Robots and robotic devices – Safety requirements for industrial robots – Part 2: Industrial robot system manual load stations.

7.1.4.2. CEN

Standards for robots currently adopted by the CEN basically refer to ISO Standards and include:

- **CEN/TC 310: EN ISO 10218-1:2011** (WI=00310088) Robots and robotic devices – Safety requirements for industrial robots – Part 1: Robots (ISO 10218-1:2011);
- **CEN/TC 310: EN ISO 10218-2:2011** (WI=00310085) Robots and robotic devices – Safety requirements for industrial robots – Part 2: Robot systems and integration (ISO 10218-2:2011);
- **CEN/TC 310: EN ISO 13482:2014** (WI=00310091) Robots and robotic devices – Safety requirements for personal care robots (ISO 13482:2014).

7.1.5. Machinery Directive

The Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 (Machinery Directive) lays down the essential health and safety requirements in relation to design and manufacture, in order to improve the safety of machinery placed on the EU market, and it also promotes the free movement of machinery within the Single Market. The said Directive applies only to products that are to be placed on the EU market for the first time. The Machinery Directive has been implemented in Greece by virtue of Presidential Decree 57/2010.

7.1.6. *Greek Regulatory Authorities and Societies for Robotics*

There is currently no national regulatory authority in the field of robotics.

There are, however, robot societies currently active in Greece, which include the following:

Hellenic Artificial Intelligence Society (EETN)	EETN is a not-for-profit scientific organization established in 1988. Among its objectives are (a) the organization and promotion of Artificial Intelligence (AI) research in Greece and abroad and (b) the promotion of AI in higher education. Since 1996, EETN is a member of the European Coordinating Committee for Artificial Intelligence (ECCAI).
Institute of Communication and Computer Systems (ICCS)	ICCS is a not-for-profit Academic Research Body established in 1989 by the Greek Ministry of Education in order to carry research and development activities in the fields of all diverse aspects of telecommunications, computer systems and techniques and their application in a variety of areas such as transceivers, radar and generally electromagnetic sensors, satellite and wireless communications, electromagnetic phenomena modelling, neural networks, systems, software and hardware engineering, telematics and multimedia applications, transport applications, control systems, robotics, biomedical engineering, electric power, renewable energy sources and distributed generation and management systems.
Agency for Educational Robotics & Science (WRO Hellas)	WRO Hellas is a not-for-profit organization. Its main objective is the development of applications of physical science and ICT and in particular the development of methods and applications of automation and robotics in education and generally in society.
South Eastern European Robotic Surgery Society (SEERSS)	SEERSS is a scientific society. Among its objectives is the promotion of knowledge and practice of robotic surgery in South Eastern Europe.

7.2. Economic Framework

Signs of the robotics and AI boom are everywhere, as a number of big technology companies have been buying robotics and AI start-ups. In 2015 alone more than 35 equity fundings and 25 acquisitions were reported.[293] These include technology giants (like Facebook, Apple, Amazon and Google) and car companies. Notably, it has been reported that a $600M joint venture was set up in order to support the roll-out of the Pepper robot in Japan and China by SoftBank, Alibaba and Foxconn.[294] Google has recently purchased at least 9 robotics and AI companies; DeepMind is one of these, for which Google is rumoured to have paid 400 million dollars.[295] States (like Israel, China, USA and South Korean) are also investing in robotics for various strategic reasons.

293. F. Tobe, *'Strategic acquisitions and long-term R&D investments abound'*, The Robot Report, 9 June 2015, http://www.therobotreport.com/news/strategic-acquisitions-and-investments-abound
294. F. Tobe, *'Foxconn and Alibaba invest in SoftBank Robotics as Pepper goes on sale in Japan'*, The Robot Report, 2015, http://www.therobotreport.com/news/foxconn-and-alibaba-invest-in-softbank-robotic-holdings
295. The Economist, *'Rise of the machines'*, 9 May 2015, http://www.economist.com/news/briefing/21650526-artificial-intelligence-scares-peopleexcessively-so-rise-machines

According to the International Federation of Robotics, by 2018 industrial robotics, professional service robotics and personal service robotics will have an estimated 15 %, 11 % and 35 % growth.[296]

7.2.1. *Initiatives on EU level*

Europe is a leader in ICT sectors like robotics and embedded systems, where it has 31 % of world market share;[297] 63 % of the non-military robots are produced by European manufacturers. In 2012 the European Commission, industry and academia launched a Public Private Partnership (PPP) in Robotics, with the objective to help companies based in Europe to take a larger share of the (then) €15.5 billion annual global robotics market. According to figures published by the European Commission, by 2020 service robotics could reach a market volume of more than 100 billion euros per year.[298]

The European Commission and 180 companies and research organisations (under the umbrella of euRobotics, a not-for-profit association for all stakeholders in European robotics), in 2014, launched SPARC, the world's largest civilian research and innovation programme in robotics. SPARK covers manufacturing, agriculture, health, transport, civil security and households, being the EU's industrial policy effort to strengthen Europe's position in the global robotics market. The expectation is that the initiative will create over 240,000 jobs in Europe, increasing Europe's share of the global market to 42 %.[299]

Notably, the European Commission funds over 100 collaborative projects[300] on advanced research into robots. The projects cover subjects ranging from autonomy, manipulation/ grasping, mobility and navigation in all terrains, to human-robot interaction and cooperative robots.[301] The EU is also currently co-funding 17 new projects in robotics under Horizon 2020 Call 1, focusing on the development of abilities and key technologies relevant for industrial and service robotics, and also aiming at introducing, testing and validating innovative solutions in a real-world context.[302]

7.2.2. *National Incentives for Innovation*

Despite the robotics and AI boom described above, the Greek State has not, as of today, provided incentives strategically and specifically for investments on robot technologies. However, reference should be made to the Investment Incentives Law 3908/2011, aiming at the

296. A.O. Hill, *'Why is Everyone Investing in Robotics? A History'*, 2 November 2015, http://blog.robotiq.com/why-is-everyone-investing-in-robotics-a-history
297. A. Ansip (Vice-President for the Digital Single Market), *'Building digital bridges: Transatlantic cooperation in ICT'*, speech at the Brookings Institute, Washington, 28 May 2015, http://europa.eu/rapid/press-release_SPEECH-15-5072_en.htm
298. European Commission, *'Digital Agenda: Commission and European industry commit to bigger and better robotics sector'*, 18 September 2012, http://europa.eu/rapid/press-release_IP-12-978_en.htm
299. European Commission, '*EU launches world's largest civilian robotics programme – 240,000 new jobs expected*', 3 June 2014, http://europa.eu/rapid/press-release_IP-14-619_en.htm
300. European Commission (Europe 2020), EU Investments: http://ec.europa.eu/digital-agenda/en/node/72886#EU%20Investments
301. '*Digital Agenda for Europe (A Europe 2020 Initiative)*', http://ec.europa.eu/digital-agenda/en/node/72886#Article
302. European Commission, *'The first robotics projects under Horizon 2020'*, Horizon 2020, https://ec.europa.eu/programmes/horizon2020/en/news/first-robotics-projects-h2020-starting

development of an efficient and attractive investment environment via tax incentives and other types of state aid. Law 3908/2011 introduces an evaluation process, which is further regulated by Ministerial Decision 17299/2011 (Gov. Gaz. B 652/20.04.2011) determining the investment evaluation criteria. "*Development of new products and new activities*" and in particular "*Robotic technologies, sensors and instruments, electronic systems and automation*" are within the scope of Law 3908/2011.

7.3. Legal Status of Robot

There is currently no Greek law specifically "on robots". However, there is legislation that can apply to some types of robotic technologies: e.g. legislation on drones (*see* Section 9) and legislation on autonomous vehicles (*see* Section 10).

Scholars examining the legal status of robots have based their arguments and conclusions on existing legal framework (e.g. product liability law or animal-related legislation). Some go one step ahead, like R. Calo, who argues that a robot could qualify as "new category of legal subject, halfway between person and object".[303]

In the legal debate whether current legal laws and doctrines are adequate to effectively and socially meaningfully regulate technologically evolving robots, or new "robot" legislation is required (considering even the attribution of legal personhood to robots), the Guidelines issued in the framework of the Robolaw EU-funded project (see Section 1) suggest that, in the light of the current technological state of art, "[t]he field of robotics is too broad, and the range of legislative domains affected by robotics too wide, to be able to say that robotics by and large can be accommodated within existing legal frameworks or rather require a *lex robotica*. For some types of applications and some regulatory domains, it might be useful to consider creating new, fine-grained rules that are specifically tailored to the robotics at issue, while for types of robotics, and for many regulatory fields, robotics can likely be regulated well by smart adaptation of existing laws".[304]

7.3.1. Robots vs. Objects

The human–robot interaction can potentially lead to damage or injuries caused to humans. Considering the current technological state of art and the stage of progress in the artificial intelligence field, it can be argued that, today, robots can – at least in most cases – fit into the legal concept of an object (product[305]) serving human needs.

In this context product liability legislation would apply, which (as further discussed in Section 4) imposes a strict liability regime on manufacturers; the latter bear the cost of defective products (robots in our case). From a policy perspective, it can be supported that the said approach operates as an additional incentive for manufacturers to produce and place in the

303. CALO, p. 549.
304. PALMERINI *et al.*, *'Guidelines on Regulating Robotics'*, p. 212.
305. BERTOLINI, p. 235.

market safe and non-defective robots, noting, however, that robotic systems can have extreme complexity; thus, ensuring flawless functionality can be a particularly demanding task and at the same time an anti-incentive for manufacturers to invest in this market.

7.3.2. Robots vs. Animals

Considering the constantly growing autonomy of robotic systems, it has been argued that, particularly in cases where damage caused by robot cannot be attributed to malfunction or defectiveness, for liability matters an analogy could be drawn between robots (especially service robots) and domesticated animals, as the latter are currently regulated in various jurisdictions.[306]

7.3.2.1. Legal definition of animal

According to a legal definition introduced in 2012 (art. 1 of Law 4039/2012 on pet animals), *animal* is "every living organism, which has the capacity to experience feelings (sentient being) and which moves on land, air and sea, or in any other aquatic ecosystem or wetland".

7.3.2.2. Strict liability

The Greek Civil Code (art. 924) introduces a strict liability regime for the possessor of a (non-domestic) animal for any damage caused by his animal to any third party. If the damage is caused by a domesticated animal used for the profession or home security or nourishment of the possessor, the latter is not liable, provided that he can prove that he has no fault regarding the control and monitoring of the animal (reverse strict liability).

7.3.2.3. Preliminary conclusions

While animal possession and treatment is specially regulated by law and despite the fact that animals are legally recognized as *sentient beings*, animals are not provided with legal personality (offering rights and imposing obligations) under Greek law. The currently applicable law, basically, regulates human actions and liability in relation with animals.

Contrary to the "robot as object" approach discussed above (where, on the basis of strict liability, it is the manufacturers that assume the defective product risk and liability), in the "robot as animal" approach, the assumption is that we are discussing non-defective products with (argued) largely non-predictable actions, where it is supported that a strict liability regime could apply, being the owner/user of the robot, who assumes responsibility for damages and injuries caused by the robot (provided that the owner/user has breached his duty-of-care responsibility). At the same time, this approach offers obvious, additional safeguards and incentives to researchers and manufacturers to enter the robot industry.

Criticism on the "robot as animal" theory argues that a robot operating unattended does not necessarily behave in an unpredictable manner (which would be the case for an animal

306. R. Kelley *et al.*, '*Liability in Robotics: An International Perspective on Robots as Animals*', 24 Advanced Robotics 13, 2010, http://ssrn.com/abstract=2271471

having its own character and instincts);[307] thus, comparison between robots and animals and introduction of a new, specific liability regime for the owner/user of a robot does not seem fit. Naturally, this would not mean that the owner/user of a robot is never liable for damage or injury caused by the robot, but his liability would be decided according to traditional fault-based liability principles.

In the light of the above and given the (apparent) development of fully autonomous robots in the (near?) future, it would seem that our current social and legal understanding of animals and also our experience with enforcement of animal regulation so far, could serve as an useful discussion basis in the robot liability legal debate.

7.3.3. Robot vs. Legal Entities

Supporters of the view that attribution of legal personhood to robots could serve social and legal needs caused by the implementation of (super)intelligent and (fully)autonomous robots often draw their arguments from the legal entities paradigm.

This high-level analysis is structured as follows: starting from the legal definition of 'person', it further examines its application on legal entities and finally highlights some common elements with the case of robots.

7.3.3.1. Legal persons

A historic approach[308]

There is no general agreement on the definition of legal person.[309] Courts and legislators – depending on their objectives – have used this term to mean a human being, or in other cases the term has been used as a formal legal device, as a legal fiction.[310] Thus, the main two approaches on legal personality are (a) that it is equated with humanity and therefore it can only be attributed to a living human being,[311] and (b) that it is "nothing more than the formal capacity to bear a legal right and so to participate in legal relations".[312] The first approach, even though it is compatible with the human rights movement, often seems to ignore legal and social needs that would justify the attribution of legal personhood to other entities,[313] and most importantly it fails to adapt to legal reality, which has already recognized e.g. corporations as legal persons. Therefore, focus will be placed on the second approach, which includes

307. For criticism on this theory *see* BERTOLINI, pp. 227 ff.
308. ZIMMERMAN, pp. 21 ff.
309. The legal debate about the definition of "person" is beyond the scope of this analysis. For an in depth approach *see*: '*What We Talk about When We Talk about Persons: The Language of a Legal Fiction*', Harvard Law Review (Note), vol. 114, no 6, 2001; N. NAFFINE, '*Who are Law's Persons? From Cheshire Cats to Responsible Subjects*', Modern Law Review, vol. 66, no 3, 2003, p. 346.
310. J. BERG, '*Of Elephants and Embryos: A Proposed Framework for Legal Personhood*', Hastings Law Journal, vol. 59, 2007, p. 371, http://ssrn.com/abstract=1084137
311. P. COLE, 'Problems with "Persons»', *Res Publica*, vol. 3, n° 2, 1997, http://www.springerlink.com/content/p233282510798181/fulltext.pdf
312. NAFFINE, p. 350.
313. NAFFINE, pp. 357 and 361.

non-human entities within its scope and it could be used as the theoretical basis of the discussion on the robot personality.

According to this second approach, legal personality is not a moral, metaphysical, philosophical or biological concept, but a purely normative concept,[314] a legal artifice indicating the capacity to bear a right or duty. *Philip Cole observes that* "[w]e do not discover persons, we create them".[315] In ancient Rome and in Germany of the Middle Ages supernatural beings, like Gods, were regarded as legal persons.[316] Cats in ancient Egypt and white elephants in Siam had legal rights and duties.[317] Legal rights and duties were attributed even to inanimate things, like church buildings and relics of the saints in the early Middle Ages and in ancient Greece to deodands.[318] In the same context, until the American civil war, slaves were not treated, in most cases, by US law as "persons", but as property; also women, until the end of the last century, in some respects (e.g. for voting or running for public offices) were not considered to be "persons".[319]

It becomes obvious that anything can qualify as legal person, as long as society and regulators find substantial reasons to protect it as such. Legal personhood can arguably be attributed to embryos and foetuses,[320] the (brain) dead,[321] animals,[322] the environment[323] and corporations.

7.3.3.2. Greek civil law

According to Greek Civil Code (art. 61) a legal person (e.g. a company) can obtain *legal personality* when the legal requirements for its formation have been met. The legal person has the capacity to be the subject of rights and duties, to own property, to conclude agreements and to be a litigant party. As provided by law, the legal capacity of a legal entity does not extend to legal relationships that presuppose the qualities and characteristics of a natural person (art. 62). Further, the legal person is liable for the acts and omissions of its representative organs performed in the course of their delegated duties (art. 71).

314. J. Ohlin, '*Is the Concept of the Person Necessary for Human Rights?*', Columbia Law Review, vol.105, 2005, p. 237, http://ssrn.com/abstract=1245942
315. Cole, p. 173.
316. J.C. Gray, *The Nature and Sources of the law*, The Columbia University Press, 1909, pp. 39-40.
317. Gray, pp. 43-45.
318. Gray, pp. 46-47.
319. Naffine, p. 346.
320. Harvard Law Review (Note), p. 1754; Berg, pp. 388 ff.
321. Naffine, p. 351; Ohlin, p. 218.
322. A. Kolber, '*Standing Upright: The Moral and Legal Standing of Humans and Other Apes*', Stanford Law Review, vol. 54, 2001, http://ssrn.com/abstract=675851; Ohlin, p. 220.
323. C. Stone, '*Should Trees Have Standing? – Toward Legal Rights for Natural Objects*', University of Southern California Law Review, vol. 45, 1972; C. Stone, '*Should Trees Have Standing? Revisited: How Far Will Law and Morals Reach? A Pluralist Perspective*', Southern California Law Review, vol. 59, 1985.

7.3.3.3. Towards a robot personality

In 2015, U.S. Patent No. 8996429, entitled *Methods and Systems for Robot Personality Development*, was issued to Google.[324] The company explains that the patent includes "methods and systems for robot and user interaction" which "generate a personality for the robot. A robot may access a user device to determine or identify information about a user, and the robot may be configured to tailor a personality for interaction with the user based on the identified information. A robot may further receive data associated with the user to identify the user, such as using speech or face recognition. The robot may provide a personalized interaction or response to the user based on the determined information of the user. In some examples, a robot's personality or personalization can be transferred from one robot to another robot, or information stored on one robot can be shared with another robot over the cloud".

A year earlier, in 2014, Aldebaran Robotics, presented Pepper, a humanoid robot; Masayoshi Son, chief executive of Softbank (a Japanese telecommunications and Internet corporation owning a majority stake of Aldebaran Robotics), announced that "for the first time in human history, we're giving a robot a heart, emotions".[325] According to the manufacturer, "Pepper is a social robot able to converse with you, recognize and react to your emotions, move and live autonomously".[326]

Social scientists have argued that, from a psychological point of view, human-robot interaction makes people project life-like qualities onto robots (especially humanoids).[327] Such emotional bonds have led e.g. to military robots being honoured with "medals" and even being offered funerals.[328]

Stone persuasively argues that "[t]hroughout legal history, each successive extension of rights to some new entity has been, (...), a bit unthinkable".[329] The above analysis showed that genetics[330] and the ability to act without relying on intermediaries[331] is not the sole basis for legal personhood. Thus, corporations, for certain legal purposes, have the status of a person.[332] Starting from this point, it could be possible to argue that by analogy other non-human entities, like robots, could theoretically under certain circumstances claim legal personhood.

Crucial factor will be the technological progress in the AI field and its embedding in robotic systems. Personality could serve as a tool to meet future social needs. In this context and with

324. G. Quinn & S. Brachmann, '*Google patents method for providing a robot with a personality*', IPWatchdog, 14 April 2015, http://www.ipwatchdog.com/2015/04/14/google-patents-method-for-providing-a-robot-with-a-personality/id=56717/
325. BBC News, '*Softbank unveils 'human-like' robot Pepper*', 5 June 2014, http://www.bbc.com/news/technology-27709828
326. Aldebaran Soft Bank Group, 'Who is Pepper?', https://www.aldebaran.com/en/a-robots/who-is-pepper
327. K. Darling, *'Who's Johnny?' Anthropomorphic Framing in Human-Robot Interaction, Integration, and Policy*', SSRN, 23 March 2015, http://ssrn.com/abstract=2588669
328. R. Fisher, '*Is it OK to torture or murder a robot?*', BBC News, 27 November 2013, http://www.bbc.com/future/story/20131127-would-you-murder-a-robot
329. *See* Stone, *Trees*, pp. 453 and 465, referring to *Santa Clara County v. Southern Pac. R.R.*, 118 US. 394 (1886), where the Supreme Court was convinced that a railroad corporation was a 'person' under the fourteenth amendment; Harvard Law Review (Note), p. 1752.
330. Berg, p. 402.
331. S. Chopra and L. White, '*Artificial Agents – Personhood in Law and Philosophy*', in Proceedings of the European Conference on Artificial Intelligence, 2004, http://www.sci.brooklyn.cuny.edu/~schopra/agentlawsub.pdf
332. Harvard Law Review (Note), p. 1752, notes that at first the "corporate personhood doctrine [had] been described as 'schizophrenic'".

a view to the future, it has also been suggested that robots should own capital, sufficient financial guarantees and insurance and also be registered in a public robot register.[333]

Drawing arguments from the legal entities example, it is important to note that corporations are recognized under a dual legal status, i.e. as property and as legal persons. Robots as well could, therefore, possibly be recognized under the same dual status,[334] serving and balancing different legal needs. Moreover, it is noted that the possession of a right does not require the physical ability to assert[335] and exercise it.[336] Thus, if legal personhood is attributed to robots, the user would possibly be the representative, the "legal guardian",[337] bringing their claims before justice. Furthermore, consciousness and self-awareness (as illustrated above in the corporations example) is not a *conditio sine qua non* for legal personhood.[338]

Stone[339] and Berg[340] note that legal personality can be either based on the interests of the entity itself, or based on the interests of a related third party. In our case this would mean identifying and protecting the robot's interests or the interest of the owner/user of the robot.[341] If technology and artificial intelligence enable robots to autonomously perform cognitive tasks[342] and legal acts,[343] serving this way society's interests and commercial purposes,[344] then it could be argued that the attribution of legal personality to robots would have become a social and legal need.[345]

7.4. Liability Regime

The traditional civil liability doctrines offer the legal framework where damage and injury caused by robots would fit in.

333. A. Bensoussan and J. Bensoussan, *Droit des robots*, Bruxelles, Larcier, June 2015, pp. 41-49 (in French).
334. The issue of robots as a property/product has positively already been discussed (*see* above, Robots vs. Objects).
335. T. Beauchamp, *The Failure of Theories of Personhood*, Kennedy Institute of Ethics Journal, vol. 9, no 4, 1999, p. 317.
336. For instance parents act on behalf of their children.
337. Stone, *Trees*, pp. 465, 471, 481-482.
338. *See* Chopra and White, referring to married women, slaves, children and persons in comas.
339. Stone, *Trees Revisited*, p. 23.
340. Berg, pp. 376 and 405.
341. C. Reed, '*Why Must You Be Mean to Me? – Crime, Punishment and Online Personality*', Queen Mary School of Law Legal Studies Research Paper No 9/2009, 4 February 2009, pp. 16-19 http://ssrn.com/abstract=1305125
342. W. Barfield, '*Issues of Law for Software Agents within Virtual Environments*', Presence: Teleoperators & Virtual Environments, vol. 14, no 6, 2005.
343. F. Andrade *et al.*, '*Contracting agents: legal personality and representation*', Artificial Intelligence and Law, vol. 15, no 4, 2007, p. 370, http://www.springerlink.com/content/n368028l51115513/fulltext.pdf; T. Allen and R. Widdison, '*Can Computers Make Contracts?*', Harvard Journal of Law & Technology, vol. 9, no 25, 1996, p. 38, http://jolt.law.harvard.edu/articles/pdf/v09/09HarvJLTech025.pdf; T. Balke and T. Eymann, '*The conclusion of contracts by software agents in the eyes of the law*', in Proceedings of the 7th international Joint Conference on Autonomous Agents and Multiagent Systems, 2008.
344. *See* Andrade *et al.*, referring to "the need for more efficient and reliable ways of undertaking actions that man alone cannot perform or cannot perform in a sufficiently and economically short delay of time".
345. See R. Bartle, '*Pitfalls of Virtual Property*', The Themis Group white paper, 2004, pp. 57-59, http://mud.co.uk/richard/povp.pdf, examining whether intelligent avatars can be IPR owners.

7.4.1. *Fault-Based Liability*

Greek civil law introduces a tort-based liability regime where anyone who *unlawfully* and *culpably* (art. 914) or intentionally and in a manner contrary to *bonos mores* (art. 919) causes damage to another, is legally obliged to restore damage. It is the injured party that must establish the elements of liability and prove *inter alia* the causal link between the fault and the damage.

7.4.2. *Strict Liability*

The principle of strict liability is introduced by Greek law in specific cases. According to the strict liability model, a person is legally responsible for damage caused by his acts or omissions regardless of culpability; thus, there is no requirement to prove fault, negligence or intention.

Examples of strict liability include (a) article 924 (para. 2) of Civil Code (damage caused by a non-domestic animal; *see* Section 3) and (b) the product liability provisions of the Consumer Protection Law 2251/1994.

7.4.2.1. **Product liability**

According to article 6 of Law 2251/1994, if a defective product causes any damage to consumers or their property, the producer[346] has to compensate it independently of whether there is or is not negligence or fault on his/her part.

It is noted that for the purposes of the product liability provisions, "product" refers to movables (explicitly including also natural forces, e.g. electricity).[347] This is crucial when discussing robots as "products", as, in principle, it seems that within the scope of the product liability provisions would fall only physical (mechanical) robots (and their physical component parts) – not virtual agents (bots, avatars) (on the types of robots *see* Section 1).

7.4.3. *Reverse Strict Liability*

The reverse strict liability principle is reversing the burden of proof; a person is deemed liable unless he can prove that there is no fault on his part. Reverse strict liability applies only in specific cases provided by law, e.g. article 924 (para. 2) of Civil Code (damage caused by a domestic animal; *see* Section 3).

346. Producer is taken to mean the manufacturer of a finished product, the producer of any raw material or the manufacturer of a component part and any person who, by putting his name, trade mark or other distinguishing feature on the product presents himself as its producer. Further, any person who imports a product for sale, hire, leasing or any form of distribution in the course of his business shall be deemed to be a producer. Where the producer of the product cannot be identified, each supplier of the product shall be treated as its producer unless he informs the injured person, within a reasonable time, of the identity of the producer or of the person who supplied him with the product.

347. I. Karakostas, *Consumer Protection Law*, Nomiki Vivliothiki, 2008, pp. 213-215 (in Greek).

7.4.4. Preliminary Conclusions

In the context of advanced robotics, identifying the liable party in case of an accident can be an extremely complicated exercise. Should it be the designer (due to poorly designed architecture), the programmer (due to a bug in a line of code), the manufacturer (due to a construction flaw), the user (due to misuse or tampering) or the robot itself (considering its autonomy and decision-making skills)?

An additional factor to consider is that robotic technology can (to some extent) depend on open source software, which, by its nature and objective, is designed to be modified, changing, eventually, the end-use of the product and, ultimately, the "behaviour" of the robot. Therefore, while (strict) liability of a manufacturer can reasonably be addressed when proprietary technology and software – with predefined functionality – is used, liability is harder to be decided when a robot uses open source software, which can be further modified having an impact on the functionality of the robot, and thus weakening the direct link with the original manufacturer of the robot.[348]

Obviously, if robots have the capacity to "think", draw conclusions and – most importantly – make decisions and take actions, it is likely that such actions could potentially be contrary to the applicable rules and ethics.

Who is to blame when a machine breaks the rules and who is to be punished? For instance, how should the law apply: (a) in the case of a drone, which, based on the data it collects and processes using its AI skills, while delivering a package for Amazon causes an accident that damages its content; or (b) in case of a driver-less car, which attempts a manoeuvre in order to avoid a collision, but necessarily causes an injury to a pedestrian; or (c) in case of a UAV, which fails to identify a military target and instead kills civilians?

When it comes to discussing liability issues, David Vladeck, professor of Law at Georgetown University, draws the line between *semi-autonomous* and *fully-autonomous* machines;[349] a *semi-autonomous* machine will function and make decisions in ways that can be traced directly back to the design, programming, and knowledge humans embedded in the machine, whereas a *fully-autonomous* machine will essentially depend on and use deep learning algorithms, which allow it to decide for itself what course of action it should take.

7.4.4.1. Semi-autonomous robots

It is suggested that semi-autonomous robots are dealt as tools and instruments used by humans or legal entities, given that the way the said machines "think" and act is controlled by humans, is predictable and can easily and reasonably be attributed to the machine's programming and design by humans. In such case, the product liability law can apply, without probably any adaptation to new technologies being required. Liability could be based, for example, on a manufacturing defect, a design flaw, poor programming, inadequate labelling and safety instructions, etc.

348. K. Kirkpatrick, '*Legal Issues with Robots*', Communications of the ACM, vol. 56, no 11, 2013, pp. 17-19.
349. D.C. Vladeck, '*Machines Without Principals: Liability Rules and Artificial Intelligence*', Washington Law Review, vol. 89, no 1, 2014, p. 117, http://digital.law.washington.edu/dspace-law/bitstream/handle/1773.1/1322/89WLR0117.pdf?sequence=1

7.4.4.2. Fully-autonomous robots

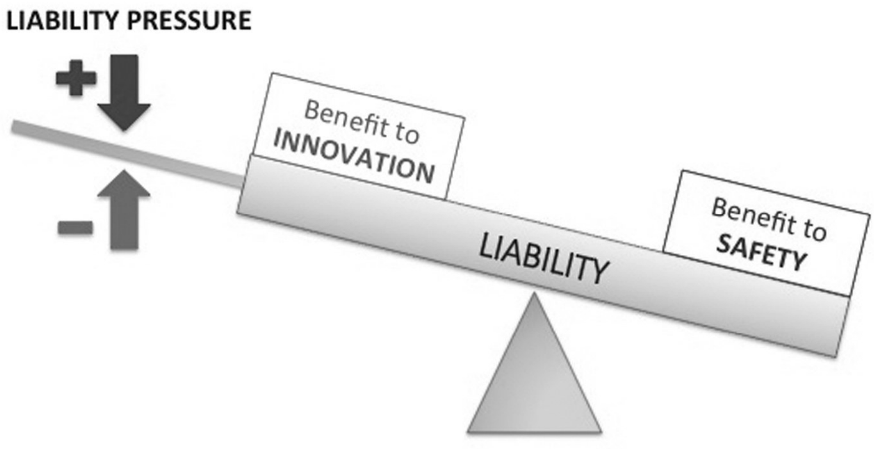
From a legal point of view, things are getting interesting when liability issues related with fully-autonomous machines are under examination. A fully-autonomous machine will be able to "think" and act in ways wholly unattributable to the fault of the programmer/manufacturer or the user of the said machine; liability models suggested by legal scholars range from strict liability[350] models to liability assigned to the machine itself, attributing to it legal personhood.[351]

The strict liability approach can be useful in instances when it is practically impossible to identify the actual party at fault (e.g. due to extreme complexity of algorithms, simultaneous operation of more robotic systems, use of open source code, use of cloud robotics,[352] etc.) or paradoxically when the liable party seems to be the machine itself (e.g. robot used or programed by another robot,[353] robots learning how to modify their own code[354]), which currently does not have legal capacity. Arguably though, it is for regulators a particularly complex exercise to choose and possibly share strict liability among involved actors. An alternative approach would be to attribute legal personhood to the machine and impose punishment on it. As discussed, legal personhood is a dynamic concept adapted to the social needs of each period of time, currently covering not only humans, but also states, corporations, etc.[355]

In the (near?) future it is likely that the first generation of fully-autonomous machines (robots) will "think" and act independently based on information they collect and analyse, making highly consequential decisions for people's lives.

Today, it is crucial to understand this new technology and how it already affects and will affect society in the future, in order to be able to regulate it effectively, taking into account the vital interests of all actors involved and affected and eventually making the best for society out of it. Key elements to consider are, in our view, *innovation* and *safety*.

350. VLADECK, p. 146 ff.; CALO, p. 535 ff.; R. KELLEY *et al.*, pp. 3 ff.
351. G. HALLEVY, "*The Criminal Liability of Artificial Intelligence Entities*", SSRN, 15 February 2010, http://ssrn.com/abstract=1564096; ZIMMERMAN, p. 34 ff.
352. J. B. BALKIN, '*The Path of Robotics Law*', California Law Review, vol. 6, 2015, p. 54, http://www.californialawreview.org/wp-content/uploads/2015/06/Balkin-Circuit.pdf
353. HALLEVY, p. 29
354. BALKIN, p. 53
355. J.M. BEARD, '*Autonomous Weapons and Human Responsibilities*' 45 Georgetown Journal of International Law, vol. 45, no 3, 2014, pp. 662-663, http://ssrn.com/abstract=2447968



On the one hand, as was the case with previous innovative technologies (a major one being the Internet), regulation should not stifle innovation; on the contrary, it should incentivize responsible innovation in this well promising field of AI. On the other hand, consumer and user safety is, and should always be, a prime consideration for regulators.

The liability model to be chosen will essentially shape the balance between the two. A predictable liability model along with a cost-spreading approach (i.e. a model where costs – including insurance costs – are reasonably absorbed by most actors involved in the machine/robot production chain and also by the machine's/robot's owner) can arguably better serve innovation than a liability regime depending on an unrealistic and impractical search for and assignment of fault.[356]

7.5. Intellectual and Industrial Property

A robot itself, the technology used, its software, parts and components and the work generated using a robot, could be eligible for protection under Intellectual and Industrial Property law.

7.5.1. Copyright Law

7.5.1.1. Works created by a robot used as a tool

According to Greek Copyright Law 2121/1993, any work of literary, artistic or scientific nature, which is original, can be protected under copyright law. Copyright protection in Greece applies to every original work of speech, art or science, on its creation and independent of its form, expression or purpose; thus, any work of literary, artistic or scientific nature, which is

356. VLADECK, p. 147

original, can qualify as "work" [article 2(1) of Law 2121/1993] and can be protected under Copyright Law.

It follows that works created using a robot, including, *inter alia* written or oral texts, musical compositions, audiovisual works, visual art works, databases and computer programs, fall within the scope of the Copyright Law.

According to both national law [article 6(2) of Law 2121/1993] and international law [article 5(2) of Berne Convention], entitlement to and exercise of copyright and copyright-related rights are not subjected to any formalities. As a result, there is no formal procedure provided for registering the author's rights over a work.[357]

7.5.1.2. Robot as an Author?

Quill, is advanced natural language generation software using Artificial Intelligence technology; it basically collects and analyses numerical data and further converts these into a written story. Impressively, as reported,[358] Quill can also take an "angle" for story, e.g. when writing about sports for an audience likely to favour a particular team, language will be used to soften the blow of a loss.

Software is already being used for the writing of news and sports reports[359] and also for drafting of company earnings reports and financial reports for investors and regulators.[360] This raises the question, whether a robot (using the software in question) can qualify as "author" of the said automatically produced stories and reports under applicable copyright legislation.

According to Greek Copyright Law (art. 2), "work" means "any original intellectual literary, artistic or scientific creation, expressed in any form". It follows that in order for a "work" to be protected, it must fulfil the following criteria:

1) It must have an intellectual content. As supported by legal scholars, this means that the work must be the product of the creator's mind/thoughts and the result of a human creative action, i.e. the work must in fact be the result of human creativity.[361]
2) It must have a form, meaning that it needs to be expressed via means that can be perceived by others.
3) It must have originality/individuality/statistic singularity.

As a result, the initial owner of the copyright (economic right) and the moral right in a work will be the natural person who is the author of the work (art. 6).

In principle, under Greek Copyright Law, it is not possible for a non-human person (e.g. a legal entity) to be deemed as the "author" (*initial rightholder* of an IPR) of a work protected by copyright.[362] Legal entities have only the legal characteristics and capacity provided by law;

357. However, submitting a work to a Notary Public is commonplace and, in the event of legal proceedings, provides useful evidence on the creation date of the ownership or the exploitation of the rights over the work.
358. T. Simonite, '*Robot Journalist Finds New Work on Wall Street*', MIT Technology Review, 9 January 2015, http://www.technologyreview.com/news/533976/robot-journalist-finds-new-work-on-wall-street/
359. The Guardian, '*The journalists who never sleep*', 12 September 2014, http://www.theguardian.com/technology/2014/sep/12/artificial-intelligence-data-journalism-media
360. Simonite, *Robot Journalist.*
361. L. Kotsiris, *Intellectual Property Law and Community Acquis*, 6th edition, Sakkoulas, 2011, pp. 65 – 76 (in Greek).
362. L. Kotsiris, E. Stamatoudi and A. Papadopoulou, *Copyright Law*, Sakkoulas, 2009, p. 202 (in Greek).

thus, as a general rule,[363] they are not eligible currently to *originally* obtain copyright. Legal persons can *secondarily* obtain intellectual property rights on a work, e.g. by means of a legal transfer of an intellectual property right (only the economic right – not the moral right) by the (original) author.

Prevailing Greek case law, as well, supports the above view. Among others, Decision 17/2009 of the Singe Member Court of First Instance of Kavala refers to the "work" as "a creative expression of the human spirit". Further, according to Decision 2864/2007 of the Athens Court of Appeal, creative work within the meaning of the copyright law is "the product of human spirit".

The general principle is that in the case of creation of a work with the use of technical means, e.g. software, the capacity of "author" is attributed to the human who programs, controls and operates the said technical means. The technology used in order to create a work is deemed as a "tool" operated and controlled by the human, i.e. the author of the work.[364] However, it is doubtful whether this approach offers legally and socially satisfying conclusions in the case of works created by autonomous robots, where the human contribution is minimum, if any; in such case the (legal) identification of the "author" is currently a complicated and debated exercise.

7.5.2. Trademarks Law

According to Greek Trademarks Law 4072/2012, a trade mark must (a) be capable of being represented graphically and (b) distinguish the applicant's goods or services from those of other undertakings. A trade mark is registered following an application filed with the Trade Marks department of the General Directorate for Commerce.

Robots are primarily covered by class 7 of the Nice Classification (*machines, machine tools, motors and engines*). Given the various functions and purposes of robots and also the great number of services they can provide, it is advisable to include additional classes, e.g. 28 (*games and playthings*), 12 (*vehicles; apparatus for locomotion by land, air or water*), 44 (*medical services*), 41 (*education; providing of training; entertainment; sporting and cultural activities*), etc.

7.5.3. Patent Law

Robots typically require and use a large amount and variety of patents. It can also be argued that, under specific circumstances, the robot itself, as a whole, or a novel method that it offers, could be eligible for patent protection.

According to Greek Patent Law 1733/1987, patents are granted for a maximum term of 20 years. To enjoy protection a patent must: (a) be an invention that presents a novelty; (b) involve an inventive step; and (c) be capable of industrial application. Patents valid in Greece include national Greek patents (granted by the Greek Industrial Property Organization), as well as

363. Greek law provides for only one **exception** to the general rule that only natural persons can be the initial rightholder of copyright: the case of anonymous or pseudonymous works, where a company (lawfully) publishes the relevant work. Until the natural person (i.e. the author) reveals his identity, the company which publishes the work is deemed to be the initial owner of the moral rights and copyrights (economic right) to the work.

364. Kotsiris, Stamatoudi and Papadopoulou, pp. 205-206; Kotsiris, pp. 102-103.

European and International Patents (under the Patent Cooperation Treaty) designating Greece. Patent Cooperation Treaty (PCT) applications designating Greece are considered as European patent applications intended for protection in Greece.

7.5.4. Utility Models and Designs

Robots can in principle also be protected under the regulation on Utility Models and Designs.

In order for a Utility Model to enjoy statutory protection in Greece, it must: (a) be new; (b) be capable of industrial application; (c) be a three-dimensional object with a predetermined shape and form; and (d) provide a solution to a technical problem. The Greek Industrial Property Organization grants utility model rights in Greece for a maximum term of seven years.

Design rights apply to works of applied arts, that is designs and models that: (a) are new; (b) present an individual character; and (c) represent the outward visible appearance of the whole or part of a product resulting from the specific features of the product and its ornamentation. Registered designs are protected through registration in Greece for a maximum term of 25 years and include national Greek, Community or international design rights. If unregistered, design rights can be protected under the Community design regulation (if novel and individualized) or under the Greek copyright legislation (if original).

7.5.5. Semiconductor Products

Semiconductor products are essential parts of robots. EU legislation provides protection to topographies of semiconductor products. According to Directive 87/54/EEC *on the legal protection of topographies of semiconductor products* (which has been implemented in Greece by virtue of Presidential Decree 45/1991), a *semiconductor product* means the final or an intermediate form of any product: (i) consisting of a body of material which includes a layer of semiconducting material; and (ii) having one or more other layers composed of conducting, insulating or semiconducting material, the layers being arranged in accordance with a predetermined three-dimensional pattern; and (iii) intended to perform, exclusively or together with other functions, an electronic function. The *topography* of a semiconductor product means a series of related images, however fixed or encoded; (i) representing the three-dimensional pattern of the layers of which a semiconductor product is composed; and (ii) in which series, each image has the pattern or part of the pattern of a surface of the semiconductor product at any stage of its manufacture.

The right to protection is granted to the person who is the topography's creator. Specific provisions apply where a topography is created in the course of the creator's employment or under a contract. Under certain conditions, protection is also granted to natural persons, companies or other legal persons who first commercially exploit a topography.

An application for registration of the topography must be filed with the Hellenic Industrial Property Organization. The rights granted are exclusive rights and include the right to authorize or prohibit reproduction of a protected topography and the right to authorize or prohibit commercial exploitation or the importation for that purpose of a topography or of a semiconductor product manufactured using the topography.

7.5.6. *Software*

Software is an essential part of the operation of a robot. Greek Copyright Law includes special provisions for the protection of software. A computer program is protected if it is original in the sense that it is the author's own intellectual creation. No other criteria apply to determine its eligibility for protection.

We highlight that, in the absence of specific contractual provisions to the contrary, reproduction, translation, adaptation, arrangement or any other alteration of a computer program does not require authorization by the author or payment of a fee, where it is necessary for the use of the computer program by the lawful acquirer in accordance with its intended purpose, including for error correction.

The creation of a back-up copy by a person having a right to use the computer program cannot be prevented by contract, in so far as it is necessary for that use. Also, specific conditions apply for decompilation.

7.6. Protection of Data Processed by the Robot

A Eurobarometer survey on autonomous systems, published on 15.06.2015, shows that a growing number of Europeans work or share their home with robots (one in seven, up from one in eight in 2012).[365] Robots can have the ability to collect and process data (including personal data). Considering also the implementation in robotic systems of Artificial Intelligence, Internet of Things (IoT)[366] and Big Data[367] (cloud robotics[368]) technologies, it becomes obvious that fully networked, data-collecting robots can challenge our privacy understanding and data protection expectations.[369]

365. European Commission, '*Robots: the more Europeans know them, the more they like them*', Digital Agenda for Europe, 15 June 2015, https://ec.europa.eu/digital-agenda/en/news/robots-more-europeans-know-them-more-they-them
366. The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data, *see* Wikipedia, The Free Encyclopedia, *'Internet of Things'*, https://en.wikipedia.org/wiki/Internet_of_Things
367. Big Data is large amounts of data produced very quickly by many different sources such as people, machines or sensors. This could be climate information, satellite imagery, digital pictures and videos, transaction records or GPS signals. Every single minute, the world generates 1.7 million billion bytes of data, equal to 360,000 DVDs. This works out at over 6 megabytes of data for each person every day, see European Commission, '*Frequently asked questions: Public-Private Partnership (PPP) for Big Data*', 13 October 2014, http://europa.eu/rapid/press-release_MEMO-14-583_en.htm
368. Cloud robotics is a field of robotics that attempts to invoke cloud technologies such as cloud computing, cloud storage, and other Internet technologies centred on the benefits of converged infrastructure and shared services for robotics. When connected to the cloud, robots can benefit from the powerful computational, storage, and communications resources of modern data centre in the cloud, which can process and share information from various robots or agents (other machines, smart objects, humans, etc.), *see* Wikipedia, The Free Encyclopedia, *'Cloud Robotics'*, https://en.wikipedia.org/wiki/Cloud_robotics
369. M. Woo, '*Robots: Can we trust them with our privacy?*', BBC (Future), 5 June 2014, http://www.bbc.com/future/story/20140605-the-greatest-threat-of-robots

7.6.1. Personal Data

While the Greek Data Protection legislation does not specifically refer to robots, we note that, in principle, personal data collection and processing by robots can fall within the scope of the said legislation, which basically includes the Data Protection Law 2472/1997 (*Protection of Individuals with regard to the Processing of Personal Data*) (DPL) and Law 3471/2006 (*Protection of personal data and privacy in the electronic telecommunications sector*) (PECL), which implement relevant EU data protection legislation (Directives 95/46/EC and 2002/58/EC).

Other sector specific data privacy regulation in place is, for instance, Law 3917/2011 (implementing Data Retention Directive 2006/24/EC), applicable to providers of publicly available electronic communication services or of public communication networks, providing for specific data retention requirements. It is noted that the Greek legal framework also includes Guidelines issued by the DPA and published on its website (e.g. Guidelines on spam, health data, internet services, new technologies, social security data, etc.) and Directives issued by the same authority (e.g. Directive 50/2001 on direct marketing, Directive 115/2001 on privacy at work, Directive 1/2005 on data deletion, Directive 1/2011 on the use of CCTV, Directive 2/2011 on electronic consent, etc.). As of today, the DPA has not issued Guidelines or Directives on data privacy issues related with robotics.

7.6.1.1. Data Controller obligations

A Data Controller using and operating a robot for the collection and processing of personal data must comply with specific requirements under Greek Data Protection Law.

7.6.1.1.1. Filing

According to the DPL, the Data Controller must notify the DPA in writing about the establishment and operation of a file/database or the commencement of data processing; exceptions apply, e.g. (a) when data processing involves clients' or suppliers' personal data, provided that such data are neither transferred nor disclosed to third parties, or (b) when processing is carried out exclusively for purposes relating directly to an employment relationship and is necessary for the fulfilment of an obligation imposed by law or for the accomplishment of obligations arising from the employment relationship, and upon prior notice to the Data Subjects (the employees).

7.6.1.1.2. Security

According to the DPL, the processing of personal data must be confidential. It must be carried out solely and exclusively by persons acting under the authority and instructions of the Data Controller. In order to carry out data processing Data Controllers and Data Processors must choose persons with professional qualifications that provide sufficient guarantees in respect of technical expertise and personal integrity in order to ensure such confidentiality and must also implement appropriate organizational and technical measures to secure data.[370]

370. It is noted that if data processing is carried out by a Data Processor on behalf of the Data Controller, such assignment must be in writing and provide that Data Processor carries out data processing pursuant to the instructions of the Data Controller and that all security obligations imposed by law on the Data Controller shall also be borne by the Data Processor.

Further, DPA Directive 1/2005 on data deletion refers to specific 'secure' deletion methods and procedures. Relevant are also the DPA Guidelines on Security Policy, Security Plan and Disaster Recovery and Contingency Plan.

7.6.1.1.3. Notice to Data Subjects

At the data collection stage, the Data Subject must be informed, at least, about: (a) the identity of the Data Controller and its representative (if any); (b) the purpose of data processing; (c) the recipients or the categories of recipients of the data; and (d) the existence of a right to access and object.

Data Subjects have the right to access the personal data relating to them and being processed by the Data Controller; the Data Subject can request and obtain from the Data Controller, without undue delay and in an intelligible and express manner, information about the nature of such personal data, their origin, the purposes of processing and the recipients, if any, thereof. Data Subjects have also the right to object to the processing of their personal data; the Data Subject can send a notice to the Data Controller, including a request for a specific action, such as correction, temporary non-use, non-transfer or deletion.

7.6.2. Protection of Secrets

Information stored by a robot but also information regarding the structure, characteristics and operation of a robot could, under specific circumstances, qualify as confidential information.

On an EU level, a proposal for a directive of the European Parliament and of the Council on the protection of undisclosed know-how and business information (trade secrets) against their unlawful acquisition, use and disclosure is currently under discussion and expected to be concluded in the near future.[371]

Greek law does not specifically refer to confidential information stored by or related with a robot; however, current legal framework can in principle apply for robots as well. Confidential information includes commercial, business information and technical-industrial know-how. It can be protected under contract, competition and criminal law against unfair practices, involving the disclosure of any confidential information without authorisation by:

- Employees, workmen or apprentices who during, or subsequently in, the termination of their employment communicate any information that has been confided to them to third parties.
- Persons who make unauthorised use of, or communicate to third parties, technical models or standards that have been confided to them in the course of trade.
- Persons who, for the purposes of competition, attempt to induce another to commit an unauthorized disclosure of confidential information.

371. For details on current status *see* European Commission, *'Trade Secrets'*, http://ec.europa.eu/growth/industry/intellectual-property/trade-secrets/index_en.htm

7.6.3. Criminal Law

Greek criminal law does not specifically refer to robots; there are, however, provisions regarding computer devices, which, it could be argued, could, in principle, cover robots as well.

According to article 370C (paragraph 2) of Greek Penal Code, whoever accesses data stored (input) in a computer or in the peripheral memory of a computer or transmitted by telecommunication systems, provided that the said acts have taken place without right, especially in violation of prohibitions or of security measures taken by the legal holder, shall be punished with imprisonment of up to three months or a fine not less than 29 Euro. If the act concerns the international relations or the security of the State, the offender shall be punished in accordance with article 148 of Penal Code (on espionage, providing for imprisonment of at least one year and under specific circumstances of life imprisonment). If the offender is in the service of the legal holder of the data, the above mentioned act shall be punished only if it has been explicitly prohibited by internal regulations or by a written decision of the holder or a competent employee thereof.

Article 370C was introduced in the Greek Penal Code back in the 1988, when the use of personal computers and networks was not as widespread as it is today. In view of this fact and considering the rapid development of technology, the language used in Article 370C is broad, in an attempt to include future illegal instances and acts within scope.

7.6.3.1. Access "without right"

Noting that access to data must be illegal ("without right"), the element of "security measures" as prerequisite for the application of article 370C is crucial. The law will in principle punish access which is "without right", meaning that the offender must access (a) data treated as private (i.e. technically protected by passwords, firewalls, encryption, etc.) or (b) data which are characterised as private, either by law (e.g. classified state information) or by its legal holder (e.g. via terms of use).

7.6.3.2. Security measures

Regarding the need for security measures, in particular, a "literal" approach and the use of the term "especially" leaves no doubt that the circumvention of security measures is not a strict prerequisite for the application of article 370C (the contrary is the case in other jurisdictions). Such reference is therefore only for explanatory and penalty assessment purposes.

7.6.3.3. Explicit prohibition by the legal holder

In the absence of helpful *ad hoc* case-law, it is debated whether, in cases when no security measures are in place and no other relevant regulations apply, the legal holder of the data should have explicitly declared to third parties that the specific content is private and access is not allowed. In our view, it is possible that access to unsecured data could still be illegal ("without right") under article 370C, even when the legal holder of the data has not positively declared his will that such data are private and not to be accessed by third parties, if the private nature of the data in question is under the circumstances reasonably assumed. For instance, the fact alone that an organization or an individual has failed (or even missed) to secure "sensitive" data or information of monetary value not intended for publication, should not establish access to such data by a third party as legal, when said third party should, considering the content of the data, reasonably assume that such data are for private use only and consent by its legal holder is required for legal access. An argument *a contrario* in support of this view would be the fact that, according to article 370C, an explicit prohibition (either by internal regulation or by a written decision) is specifically required in cases when the offender is in the service of the legal holder of the data. Therefore, it would be fair to assume that such explicit prohibition is not strictly required in all other instances.

7.7. Robot Contracts

Autonomous systems, like robots, will be increasingly used for legal transactions. For instance, automated stock trading [High-frequency trading (HFT)][372] uses algorithms to execute pre-programmed "robot" trading instructions.[373] It is estimated that in 2012 HFT accounted for approximately 50 % of all US equity trading volume.

In the same context, Bitcoin is an open-source digital asset and a payment system, which enables users to transact directly, using peer-to-peer technology, without an intermediary (central authority or bank). Transactions are verified by network nodes and recorded in a public distributed ledger called the *blockchain*. The Bitcoin protocol enables the performance of *smart contracts*, which are concluded without human intervention and can be triggered under certain conditions.[374] This is the case, e.g. of Ethereum, a decentralized platform that runs *smart contracts*, allowing a network of peers to administer their own user-created smart contracts in the absence of central authority (*Solidity* is called the *smart contract* language used for Ethereum).

More specifically, *smart contracts* are computer protocols that facilitate, verify, or enforce the negotiation or performance of a contract.[375] In simple terms, the rules of a contract are

372. High-frequency trading (HFT) is a type of algorithmic trading characterized by high speeds, high turnover rates, and high order-to-trade ratios that leverages high-frequency financial data and electronic trading tools. It is the use of sophisticated technological tools and computer algorithms to rapidly trade securities, *see* Wikipedia, The Free Encyclopedia, *'High Frequency Trading'*, https://en.wikipedia.org/wiki/High-frequency_trading. Relevant is the *2010 Flash Crash*, a United States trillion-dollar stock market crash, lasted for approximately 36 minutes; HFT contributed to the *2010 Flash Crash* by demanding immediacy ahead of other market participants.

373. D. Headrick, '*The Ethics and Law of Robots*', Research – Technology Management, May – June 2014, pp. 6-7.

374. A. Bensoussan and J. Bensoussan, *Droit des robots*, Bruxelles, Larcier, June 2015, p. 80

375. Wikipedia, The Free Encyclopedia, *'Smart Contract'*, https://en.wikipedia.org/wiki/Smart_contract; *see* also: G.W. Peters and E. Panayi, '*Understanding Modern Banking Ledgers Through Blockchain Technologies: Future of Transaction Processing and Smart Contracts on the Internet of Money'*, SSRN, 18 November 2015, http://ssrn.com/abstract=2692487; J.M. Newman, '*Innovation Policy for Cloud-Computing Contracts*', SSRN, 5 December 2014, Handbook of Research on Digital Transformations (Francisco-Xavier Olleros & Majlinda Zhegu eds, 2016, Forthcoming), http://ssrn.com/abstract=2534597; J. Fairfield, '*Smart Contracts, Bitcoin Bots, and Consumer Protection'*, Washington and Lee Law Review Online, vol. 71, no 2, 2014, pp. 36-50; S. Thomas and E. Schwartz, '*Smart Oracles: A Simple, Powerful Approach to Smart Contracts'*, GitHub, 2014, https://github.com/codius/codius/wiki/Smart-Oracles:-A-Simple,-Powerful-Approach-to-Smart-Contracts; N. Szabo, '*Formalizing and Securing Relationships on Public Networks*', http://szabo.best.vwh.net/formalize.html

encoded in computer code, which is further replicated and executed across the blockchain's nodes. The *smart contract* is self-enforcing, meaning that it will monitor indicated external inputs (e.g. financial exchange) from a trusted source (often called "oracle") and it will execute the contract's provisions accordingly.[376]

In 2015 two blockchain-based platforms for trading smart contracts, which are designed to speed up and simplify trading securities, launched in Wall Street.[377] According to reports, IBM has been developing its own version of blockchain, which could be used to create secure online contracts.[378]

At this early stage of implementation and use of *smart contracts*, it can be argued that traditional concepts and principles of civil law can apply, identifying the platform operator behind the robot – avatar as an agent used by the contracting parties. *Smart contracts* seem to have the potentials of a disruptive technology, which could raise jurisdictional, court-enforcement, taxation, data privacy and data integrity considerations.

7.8. Robots in the Health Sector

The Horizon 2020 Robotics Multi-Annual Roadmap ICT-2016 (MAR 2016), prepared by SPARC[379], the partnership for robotics in Europe, includes a detailed technical guide that identifies expected progress within the EU and provides an analysis of medium to long term research and innovation goals[380]. According to MAR 2016, the development of healthcare robotics covers a wide range of different potential applications, including:

- **Clinical robots** (robotics for surgery[381], diagnosis and therapeutic processes);
- **Rehabilitation robotics and prosthetics** (direct physical interaction with a robot system which either enhances recovery or acts as a replacement for lost function);
- **Assistive robotics** (primary function of the robotic system is to provide assistive help either to carers or directly to patients).

376. Peters and Panayi, p. 7
377. P. Vigna, '*BitBeat: Smart Contracts Land on Wall Street*', The Wall Street Journal, 5 August 2015, http://blogs.wsj.com/moneybeat/2015/08/05/bitbeat-smart-contracts-land-on-wall-street/
378. R. McMillan, '*IBM Adapts Bitcoin Technology for Smart Contracts*', *The Wall Street Journal*, 16 September 2015, http://www.wsj.com/articles/ibm-adapts-bitcoin-technology-for-smart-contracts-1442423444
379. SPARC is jointly run by the European Commission (representing the public side) and euRobotics AISBL, the association of the European robotics community, which includes robotics manufacturers, component manufacturers, systems integrators, end users, trade fair organisers, venture capitalists, research institutes, universities. SPARC develops recommendations to the Commission for funding within the area of Robotics under Horizon 2020. SPARC aims to make available European robots in factories, in the air, on land, under water, for agriculture, health, rescue services, and in many other applications in Europe which have an economic and societal impact; further details available at www.sparc-robotics.eu
380. A Robotics for Healthcare study funded by the European Commission identified in 2008 main innovation areas including: smart medical capsules, robotised surgery, intelligent prosthetics, robotised motor coordination analysis and therapy, robot-assisted mental, cognitive and social therapy, robotised patient monitoring systems.
381. The surgical robot device market, estimated at $2.4bn in 2011, is anticipated to reach $8.5bn by 2018 as next generation devices, systems, and instruments are introduced.

7.8.1. Medical Devices

Directive 98/79/EC *on in vitro diagnostic medical devices* and Directive 93/42/EEC *concerning medical devices* have both been incorporated into national law by virtue of Ministerial Decisions no. 3607/892/2001 (Gov. Gaz 1060/B/10.8.2001) and 130648/2009 (Gov. Gaz. 2198/B/02.10.2009), respectively.

In the above-mentioned legislation medical device is defined as any instrument, apparatus, appliance, material or other article, whether used alone or in combination, including the software necessary for its proper application intended by the manufacturer to be used for human beings for the purpose of: (a) diagnosis, prevention, monitoring, treatment or alleviation of disease; (b) diagnosis, monitoring, treatment, alleviation of or compensation for an injury or handicap; (c) investigation, replacement or modification of the anatomy or of a physiological process; (d) control of conception, and which does not achieve its principal intended action in or on the human body by pharmacological, immunological or metabolic means, but which may be assisted in its function by such means.

The said definition is broad enough to include healthcare robots, as described herein above. According to the directives in question Member States must take all necessary steps to ensure that devices may be placed on the market and put into service only if they do not compromise the safety and health of patients, users and, where applicable, other persons, and that they meet the provided essential requirements.

7.8.2. Sensitive Personal Data

Healthcare robots, depending on their specifications and use, can collect and process sensitive personal data, e.g. health data of the patient. Therefore, such collection and processing would fall within the scope of the Greek Data Protection Law 2472/1997 (DLP), provided that (a) either the Data Controller is located in Greece or (b) the abroad-based Data Controller uses a Data Controller in Greece.

The collection and processing of sensitive data is prohibited. The DPL defines "sensitive data" as data referring to racial or ethnic origin, health, sexual life and social welfare. Exceptionally, collection and processing of sensitive data may be permitted by virtue of a Permit issued by the Hellenic Data Protection Authority (DPA), under specific conditions, e.g. when the Data Subject has provided his written consent, or when processing is carried out exclusively for research and scientific purposes, provided that anonymity is ensured and all necessary measures for the protection of the persons involved are taken, or when processing is carried out by a public authority and (a) it is necessary for the purposes of national security, protection of public health, tax enforcement or (b) it pertains to the detection of offences.

Apart from the DPL, which applies horizontally, for health data in particular, the following would also be applicable: the Medical Ethics Code (Law 3418/2005), Law 2071/1992 on the national health system and article 371 of the Greek Penal Code, according to which medical professionals must maintain their patients' medical data confidential. DPA Decisions 33/2007 and 43/2011 placed significant emphasis on the organizational and technical measures that the Data Controller (the Ministry of Justice and a public hospital respectively in the aforementioned Decisions) needs to implement, especially when sensitive health data are being collected and processed. Recent DPA Decision 46/2011 dealt with the issue of medical data transfer from one insurance company to another. The transfer was not prohibited *per se*, but it was permitted under strict circumstances (e.g. the patient needs to be properly informed, the DPA needs to issue a relative Permit, as applicable in each case).

Relevant are also ISO 13485:2003 (Medical devices – Quality management systems – Requirements for regulatory purposes) and ISO 22442-1:2015 (Medical devices utilizing animal tissues and their derivatives – Part 1: Application of risk management). It is further noted that CEN has established the Technical Committee 251 (TC 251), a workgroup working on standardization in the field of health information (Health Informatics). The CEN/TC 251 Standards are further "adopted" by ELOT.[382]

According to DPA Directive 1/2011 on the use of video surveillance systems for the protection of people and property, installation and operation of CCTV systems is permitted for the needs of provision of health services, including the monitoring of psychic or mental patients who can cause further damage to their health or to third parties and also including the monitoring of patients in Intensive Care Units. Monitoring must be controlled by individuals bound *by professional secrecy.*

7.9. Drones and Surveillance Robots for Civil Use

According to MAR 2016[383] the list of potential Aerial Robotics applications is extensive and can be divided into a number of different application areas including (a) inspection and maintenance; (b) logistics and delivery; (c) search and rescue; and (d) environmental monitoring. As mentioned in MAR 2016, the lack of regulations for small aircraft has impacted the development of the aerial robotics market in the EU. However, new regulations for Light Unmanned Aerial Systems (LUAS) or Very Light Aerial Robotic Systems (VLUAS) already developed or being developed in many EU countries are eliminating the barriers.

7.9.1. CCTV

The legal framework for the installation and operation of a CCTV system is the Data Protection Law 2472/1997 and the Directive 1/2011 on the use of video surveillance systems for the protection of people and property issued by the Hellenic Data Protection Authority (DPA). The main rule and criterion that a Data Controller must follow when designing and implementing a CCTV system is the *principle of proportionality*; a balance must be reached between the need to protect individuals and private property and the respect of the Data Subjects' privacy rights.

The Data Controller of a CCTV system must (i) file a notification with the DPA; (b) inform with warning signs that CCTV cameras are in place; and (c) take all necessary measures for

382. For further details on ISO and CEN standards *see* above section 1 (Technical Framework).
383. For details on MAR 2016 *see* Section 8 (Robots in the Health Sector).

secure data processing. In specific cases the Data Controller must obtain a Permit by the DPA e.g. if sensitive data are being recorded, or if data retention period exceeds 15 days.

It is noted that the CCTV legislation covers CCTV systems, which are permanently installed in a specific location. Therefore, it seems that moving surveillance robots and drones carrying recording equipment do not seem to be covered by the provisions of the above-mentioned legal framework.

7.9.2. Drones

7.9.2.1. WP29 Opinion 01/2015

The DPA adopts and follows the views of the article 29 Data Protection Working Party (an independent European advisory body on data protection and privacy[384]), which on 16 June 2015 published the "*Opinion 01 /2015 on Privacy and Data Protection Issues relating to the Utilisation of Drones*".

Opinion 01/2015 summarizes the current status of the use of drones and highlights relevant legal challenges:

> "In light of the progressive integration of drones into the European civil airspace and the emergence of numerous applications of drones (ranging from leisure, services, photography, logistics, surveillance of infrastructures) there is a real need to focus on the challenges that a large-scale deployment of drone and sensor technology could bring about for individuals' privacy and civil and political liberties and to assess the measures necessary to ensure the respect for fundamental rights and data protection."
>
> "Indeed, several privacy risks may arise in relation to the processing of data (such as images, sound and geolocation relating to an identified or identifiable natural person) carried out by the equipment on-board a drone. Such risks can range from a lack of transparency of the types of processing due to the difficulty of being able to view drones from the ground to, in any event, a difficulty to know which data processing equipment are on-board, for what purposes personal data are being collected and by whom."
>
> "Even higher risks for the rights and freedoms of individuals arise when the processing of personal data by means of drones is carried out for law enforcement purposes."

The opinion provides guidelines for Data Controllers and regulators in order to correctly address the data protection rules in the context of drones, including the following:

- Need for a specific authorization from Civil Aviation Authorities (CAAs) when national law allows to operate a drone;
- Criteria for legitimate processing must comply with the purpose limitation, data minimization and proportionality principles (by choosing the most proportionate technology and measures to avoid the collection of unnecessary personal data) and fulfil the transparency principle (by informing data subjects of the processing carried out);

384. Working Party was set up under Article 29 of Directive 95/46/EC. It is an independent European advisory body on data protection and privacy. Its tasks are described in Article 30 of Directive 95/46/EC and Article 15 of Directive 2002/58/EC.

- Suitable security measures;
- Deletion or anonymisation of personal data which are not strictly necessary;
- Adoption of measures of *privacy by design* and *privacy by default*;
- Preparation of data protection impact assessment, as a suitable tool to assess the impact of the application of drone technology on the right to privacy and data protection;
- Manufacturers of drones are encouraged to provide sufficient information within the packaging (for examples within the operating instructions) relating to the potential intrusiveness of these technologies and, where possible, of maps clearly identifying where their use is allowed;
- Law enforcement data processing carried out by means of drones should, as a rule, not allow for constant tracking and technical and sensing equipment used must be in line with the purpose of the processing.

7.9.2.2. Greek legal framework

The Greek regulatory framework on drones is basically included in the Model Aircraft Flight Regulation (MAFR), published in 2010.[385] According to MAFR, drones are flying devices, which do not carry people. Drones of limited size (from 350 g up to 25 kg), which may (or may not) have a propulsion system and which are to be used for sports and leisure, are named in MAFR as "Model Aircraft" (MAs); these are further divided into two main categories based on their size (Category A for drones from 350 g up to 7 kg and Category B for drones from 7 kg up to 25 kg). MAFR includes specific provisions, *inter alia*, on the technical characteristics of MAs, on liability matters and on location/operation restrictions, depending on the Category, A or B, they belong to. MAFR also refers to drones which are developed to be used for scientific, research and military purposes, named as "Unmanned Aeronautical Vehicles" (UAVs), without, however, including further rules and provisions on UAVs.

Name in MAFR	Size	Purpose
Model Aircraft (MAs)	Category A: 350 g – 7 kg	Sports and leisure
	Category B: 7 kg – 25 kg	
Unmanned Aeronautical Vehicles (UAVs)		Scientific, research and military purposes

Noting that MAFR seems to cover only MAs, the regulatory status for drones larger than 25 kg is currently vague causing legal uncertainty as to their flight requirements. Further and oddly enough, use of drones for commercial or business purposes ("aerial works" according to MAFR's terminology) is not regulated in detail; according to MAFR, use of drones for "aerial works" is permitted only for MAs, while a permit could be required, without, however, defining the terms and conditions for the grant of such permit.

385. Decision Δ2/Δ/352/17475 of the Commander of the Hellenic Civil Aviation Authority (HCAA) ("Model Aircraft Flight Regulation"), published on 13.01.2010 (Gov. Gaz. B 9/13.01.2010).

In the light of the above (currently inefficient in practical terms) Greek legal framework and considering the current debate on the use of 'commercial drones', which is largely triggered and driven by entities like Amazon,[386] Google[387] and Facebook,[388] while exploring new business models making use of the technologies in question, one can notice that the 2010 MAFR does not properly and effectively address the use of drones for commercial or business purposes. Current business needs will influence legal developments; new legislation will need to consider new business models, obvious aviation safety matters and, most interestingly, liability issues and data privacy aspects.

7.10. Smart Cars

7.10.1. Intelligent Cars

New technologies, Intelligent Transport Systems (ITS)[389] and ICT-based systems and services are already installed in cars (e.g. autonomous emergency braking and lane-departure warning systems) and are already regulated on EU level.[390] Vehicle-to-Vehicle (V2V) technologies are already implemented, which allow automobiles to exchange data. Similarly, Vehicle-to-Infrastructure (V2I) technologies enable the wireless exchange of critical safety and operational data between vehicles and roadway infrastructure, intended primarily to avoid motor vehicle crashes.

Under the Directive 2010/40/EU on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport, the European Commission has to adopt specifications (i.e. functional, technical, organizational or services provisions) to address the compatibility, interoperability and continuity of ITS solutions across the EU. Priorities are the traffic and travel information, the eCall emergency system and intelligent truck parking.

7.10.1.1. Greek legal framework

Greece has implemented Directive 2010/40/EU by virtue of Presidential Decree 50/2012. In the same context, the EU Regulation 2015/758 concerning type-approval requirements for the deployment of the eCall in-vehicle system based on the 112 service is directly applicable in Greece. In 2014, by virtue of the Ministerial Decision 145/2014 (Gov. Gaz. B 912/11-4-2014),

386. Amazon *Prime Air* is a future delivery system from Amazon designed to deliver packages to customers in 30 minutes or less using small drones; further details available at http://www.amazon.com/b?node=8037720011
387. BBC News, *'Google plans drone delivery service for 2017'*, 2 November 2015, http://www.bbc.com/news/technology-34704868
388. *Aquila* is Facebook's solar-powered drone. The company plans to use a linked network of the drones to provide Internet access to large rural areas; for further details *see* A. Hern, *'Facebook launches Aquila solar-powered drone for internet access'*, The Guardian, 31 July 2015, http://www.theguardian.com/technology/2015/jul/31/facebook-finishes-aquila-solar-powered-internet-drone-with-span-of-a-boeing-737
389. "Intelligent Transport Systems" or "ITS" means systems in which information and communication technologies are applied in the field of road transport, including infrastructure, vehicles and users, and in traffic management and mobility management, as well as for interfaces with other modes of transport.
390. Kirkpatrick, p. 18

a Working Group was set-up for the drafting of a National Strategy for Intelligent Transport Systems.

Specifically on the data privacy consideration of the use of ITS, reference is made to Article 10 (Rules on privacy, security and re-use of information) of the Directive 2010/40/EU, according to which Member States must ensure that (a) the processing of personal data in the context of the operation of ITS applications and services is carried out in accordance with EU data privacy rules and (b) personal data are protected against misuse, including unlawful access, alteration or loss, encouraging the use of anonymous data, where appropriate, for the performance of the ITS applications and services. It is also noted that where special categories of personal data are involved (e.g. health data), Member States must also ensure that the provisions on consent to the processing of such personal data are respected.

7.10.2. Driverless Cars

According to Dr Jean-Luc Di Paola-Galloni, co-chairman of the European Road Transport Advisory Council (ERTRAC), driverless cars could be on our roads in just four years' time; thus, EU regulation is required.[391] According to scientists, self-driving vehicles could reduce urban vehicle numbers by as much as 90 %.[392]

Notably, many technology and web services companies (including Apple, Baidu, Google, Molileye) and most automobile companies (Tesla, BMW, Audi, Ford, to name a few) have, during the last few years, heavily invested in this technology.

In the USA there is currently legislation in place regulating self-driving vehicles.[393] However, most jurisdictions will need to amend the currently applicable road traffic legislation in order to adapt to the driverless vehicles reality. It is noted that according to the 1968 Vienna Convention on Road Traffic regulating international driving, "[e]very moving vehicle or combination of vehicles shall have a driver" and "[e]very driver shall at all times be able to control his vehicle" (art. 8); thus, amendment of the Vienna Convention on Road Traffic will also be required.

7.10.2.1. Greek legal framework

According to article 13 of Law 2696/1999 (Code of Road Traffic), "every moving vehicle (...) must have a driver". Also, "the driver must at the time of driving be able to control the vehicle". The legal language used and also the general approach adopted by the law, does not allow any room for interpretations permitting a general use and operation of autonomous driverless cars in Greece. An exception (under strict limitations) to this conclusion is the case of a pilot operation of a driverless urban bus, discussed below.

391. C. Collins, '*The EU needs to regulate for cities with driverless cars – Dr Jean-Luc di Paola-Galloni*', Horizon, 29 June 2015, http://horizon-magazine.eu/article/eu-needs-regulate-cities-driverless-cars-dr-jean-luc-di-paola-galloni_en.html

392. The Economist (The World If), *'If Autonomous Vehicles Rule the World'*, 1 August 2015, http://worldif.economist.com/article/11/what-if-autonomous-vehicles-rule-the-world-from-horseless-to-driverless

393. For legislative and regulatory developments in the USA related to automated driving, automatic driving, autonomous driving, self-driving vehicles, and driverless cars, *see* G. Weiner and B. Walker Smith, *'Automated Driving: Legislative and Regulatory Action'*, Centre for Internet and Society, http://cyberlaw.stanford.edu/wiki/index.php/Automated_Driving:_Legislative_and_Regulatory_Action

7.10.2.1.1. CityMobil2

A program, part of a European Union-funded project called CityMobil2,[394] currently active in Trikala, Greece[395] (ICCS is handling the technical side of the project), has enabled the legal operation of a driverless vehicle in Greece, having triggered an amendment in the Code of Road Traffic in order to include the use of driverless vehicles.

The said pilot program has introduced the operation of a fully automatic, driverless bus, which travels and serves commuters; strict limitations apply (e.g. the maximum permitted speed is around 20 km per hour, the bus is not allowed to change lanes or make turns and in case of an obstacle in its path the vehicle stops and waits for the object to move/be moved).

More specifically, according to article 34 of Law 2696/1999 (as amended by article 48 of Law 4313/2014), by way of exception of article 13, "an urban bus is allowed to travel on the road without the presence of a driver therein (...) only for research purposes *in a pilot implementation framework".* Specific terms and conditions for the operation of the urban bus are included in the Ministerial Decision 50308/7695 (Gov. Gaz. B 1837/26/08/2015).

The driverless urban bus must have adequate mechanisms and automated systems, which ensure traffic behaviour, braking and stopping of the vehicle, corresponding to a conventional car with driver. It is important to highlight that requirement for the operation of the driverless urban bus is – for reasons of safety – the "monitoring as the Bus and the road on which it moves throughout the course of its movement from a Control Centre via cameras (...) installed in the vehicle and in predefined points of the course of its movement, in order to have complete control of the movement of the vehicle and the traffic on the road, so that there is ability to remotely stop the vehicle from the Control Centre in case of an emergency". According to article 34, the individual responsible for the monitoring of the driverless urban bus must hold a driver's license and "is liable/responsible in accordance with the provisions of the Code of Road Traffic as a driver of the vehicle to stop the vehicle, if needed by the circumstances or in case of an emergency".

7.10.3. Insurance Policies

The use of smart cars on a market scale, the relevant accident-likelihood estimates[396] and the liability considerations linked with this technology can obviously affect the insurance business. In February 2015 three big American insurers noted in their financial statements that driverless cars threaten to disrupt their business.[397]

Along with the introduction of driverless cars comes a business model that could potentially further disrupt the car insurance business. It is likely that driverless cars will challenge the very

394. CityMobil2 aims to develop public transportation projects in medium-sized cities with the use of automated transport systems (using the existing road infrastructure) made up of vehicles operating without a driver in collective mode.

395. L. Chain, '*In Greece, Driverless Buses Are Now Accepting Passengers*', Popular Science, 6 November 2015, http://www.popsci.com/driverless-buses-go-with-traffic-flow

396. According to Google, in the six years of the Google Self-Driving Car Project, the self-driving car has been involved in 12 minor accidents during more than 1.8 million miles of autonomous and manual driving combined. Not once was the self-driving car the cause of the accident, *see* Google Self-Driving Car Project Monthly Report, May 2015, https://static.googleusercontent.com/media/www.google.com/el//selfdrivingcar/files/reports/report-0515.pdf

397. The Economist (The World If), *'If Autonomous Vehicles Rule the World'*

notion of car ownership, as the target group of the car manufacturers will gradually shift from individual consumers to governments and legal entities offering public transportation services (according to news reports[398], Google is already exploring the potentials of this service model). There will be no need for a consumer to buy a car (including a driverless one), provided that a fleet of driverless vehicles will be available upon request (think the Uber and Taxibeat model without a driver) or on a scheduled basis (like current public transportation).

It is noted that the CityMobil2 car mentioned above is insured by a major private Greek insurance company for civil liability.[399] Details of the policy are not publicly available.

398. K. Naughton, *'Can Detroit Beat Google to the Self-Driving Car?'*, Bloomberg Businessweek, 29 October 2015, http://www.bloomberg.com/features/2015-gm-super-cruise-driverless-car/

399. Interamerican, 11 November 2015, https://www.interamerican.gr/default.asp?pid=177&rID=886&la=1 (in Greek)