

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/CLSRComputer Law
&
Security Review

Structuring modern life running on software. Recognizing (some) computer programs as new “digital persons”

Vagelis Papakonstantinou^{a,1,*}, Paul De Hert^{a,b,1,*}^aFree University of Brussels (VUB-LSTS), Belgium^bTilburg University (TILT), The Netherlands

ARTICLE INFO

Article history:

Keywords:

Digital persons

Software

Computer programs

Legal personality

ABSTRACT

Saudi Arabia grants nationality to an AI robot; the first “clash of robots” took place in Japan; and, Bill Gates suggests that robots start paying taxes. We believe that these developments justify new legal fiction interventions. Software has long now exceeded the intellectual property boundaries. It is no longer merely property; it has assumed life of its own. It does not matter that such life is imaginary today. Legal persons were brought to life through legal fiction intervention that was based on much less motivation – merely the human incentive for profit. Software is certainly connected today with profit, given that the world’s most valued corporations are software companies. However, it has moved much further than that, to assume in many ways artificial life of its own. We think that it is time that the dichotomy between natural and legal persons, that has served humanity so well over the past centuries, now be trisected: A new, digital person, ought to be added to it.

© 2018 Vagelis Papakonstantinou and Paul De Hert. Published by Elsevier Ltd. All rights reserved.

1. Introduction: trisecting the natural/legal person dichotomy to allow recognition of the “digital person”

Yuval Noah Harari, in his popular book *Sapiens: A Brief History of Humankind*,¹ brings forward a new narrative of humanity’s creation and evolution. A central argument of his analysis focuses on the power of human beings to create fictions that later become real-life structuring elements of human societies. In order to draw a powerful, and elucidating, picture on legal fiction, he gives the example of Peugeot SA, the automobile industry company:

Modern business-people and lawyers are, in fact, powerful sorcerers. The principal difference between them and tribal shamans is that modern lawyers tell far stranger tales. [...] It all revolves around telling stories, and convincing people to believe them. [...] In the case of Peugeot SA the crucial story was the French legal code, as written by the French parliament. According to the French legislators, if a certified lawyer followed all the proper liturgy and rituals, wrote all the required spells and oaths on a wonderfully decorated piece of paper, and affixed his ornate signature to the bottom of the document, then hocus pocus – a new company was incorporated. When in 1896 Armand Peugeot wanted to create his company, he paid a lawyer to go through all these sacred procedures. Once the lawyer had performed all the right rituals and

* Corresponding authors. Law Science Technology & Society (LSTS), Vrije Universiteit Brussel, Pleinlaan 2, B-1050 Brussels, Belgium.
E-mail addresses: vpapakonstantinou@mplegal.gr (V. Papakonstantinou), paul.de.hert@vub.ac.be, paul.de.hert@uvt.nl (P. De Hert).

¹ <http://dx.doi.org/10.1016/j.clsr.2017.03.008>.

¹ Harper editions, 2015.

*pronounced all the necessary spells and oaths, millions of upright French citizens behaved as if the Peugeot company really existed.*²

Harari continues to explain that “Peugeot is a figment of our collective imagination. Lawyers call this a “legal fiction”. It can’t be pointed at; it’s not a physical object. But it exists as a legal entity. Just like you or me, it is bound by the laws of the countries in which it operates. It can open a bank account and own property. It pays taxes, and it can be sued and even prosecuted separately from any of the people who own or work for it.”³ He considers “the idea behind such companies among humanity’s most ingenious inventions”, providing Sapiens’ with immense power, that ultimately was proven key to humanity’s contemporary success.⁴

Harari’s vivid illustration is basically correct. Modern life is indeed built upon the dichotomy between a natural and a legal person. In fact, any actor in a human society can be either one. Anybody that is permitted to execute an action, carry rights and obligations and incur liabilities may either be a natural person (meaning, a living human being) or a legal person (an organization recognized as such by law). Variations within the above two categories may well exist (for example, an individual may carry limited ability to enter into contracts or an organization may be anything from an international organization to a commercial enterprise), nevertheless the fact remains that anything different is, simply, inconceivable. This is the way the legal world, and thus human life, is structured today.

Obviously, as correctly noted by Harari, this is essentially an artificial construction.⁵ Only natural persons exist in the real world. Legal persons are a theoretical device. It was, however, conceived to better cope with reality.⁶ The background of legal persons, explaining their *raison d’être* and their historical evolution, is well catalogued by now. Their roots are traced as back as in Roman law or, at the latest, in church history and *persona ficta*. Their contemporary form has taken form almost a hundred years ago.⁷ It was at that same time when the last objections to legal persons, representing a group of humans in transactional life, were last expressed⁸ – and subsequently silenced forever.⁹ Since then corporate vehicles have been taken for granted by legal theory and philosophy.

² Pp.31ff.

³ P.32.

⁴ *Ibid.*

⁵ See also the, German, discussion on Fiktions- and Realitätstheorie in MüKo-BGB/Reuter, Vor § 21, Rn. 1 ff, 6. Auf., Bd. I, 2012, as well as, in Flume W, *Allgemeiner Teil des Bürgerlichen Rechts*, B. I/2, Die juristische Person, 1983, S. 3 ff. (3–31).

⁶ While they may have been practiced at first as convenience, or even expedience, vehicles, contemporary theory attributes legal persons to efficiencies in costs and doing business (see Micklethwait J/Woolridge A, *The Company: A Short History of a Revolutionary Idea*, Orion, 2003).

⁷ Arbitrarily setting a milestone, the British Limited Liability Act was released in 1855.

⁸ For a brief description of criticisms against the, then, new idea of companies, see the Introduction in Micklethwait J/Woolridge A, *ibid.*

⁹ No serious criticism against legal persons has been expressed for the last 100 years. Critics at times only aim against corporations, but again not blaming the idea *per se*, but rather certain of its many parameters (for example, management accountability, management and shareholders’ relationships, minority rights).

Notwithstanding Harari’s enthusiastic analysis above, that is pursued in his sequel, *Homo Deus: A Brief History of Tomorrow*,¹⁰ where he claims that humanity is on its way to divinity, the truth is that humanity’s legal imagination stopped working ever since. Legal persons are among last pieces of legal fiction developed by humanity,¹¹ and this happened hundreds of years ago. We suggest in this paper that maybe, in order for *Homo Sapiens* to continue living successfully in the future and perhaps fulfil its destiny for becoming *Homo Deus*, we may now need to create one more piece of legal fiction, that of the digital person.

2. Legal personality: not much more than the right to transact and a unique number to do so

A natural and a legal person are not opposites. They are complementary, in the sense that together they encompass all of the lawful ways of existence. They are also distinct from each other. An actor today can have either one of these faculties, not both. Notwithstanding cases of single-member companies or “lifting the corporate veil”¹² attempts, modern life and the law converge to the same conclusion, that of mutual exclusiveness.

Few legal issues pertain to the natural person, it being the obvious actor in real life. Legal discussions today mostly evolve around the issue of the beginning (birth) and end (death) of human life.¹³ A series of legal, and ethical, questions are still being asked on when exactly an individual exists, and thus carries rights, and when it stops doing so, and thus loses them (or, at least, has them substantially reduced). We suppose that these issues will continue to surface for as long scientific findings make it ever more difficult to specify the start and end of human life. Other than that, contemporary legal systems are taking into account decreased (luckily, not increased) levels of human ability to act, in cases of entering into contracts or being put to prison. While here too biology may surprise us in the future, if it proves that human’s freedom to act is also legal fiction, and that each one of us is predetermined by her genes, legal science should be considered for most cases as settled in the case of natural persons.

This is much less the case on legal persons – without this meaning, however, that the main legal issues have not been settled here too. A legal person is, essentially, an association of people or an assembly of capital aimed at carrying out a common cause. Two are the basic characteristics of such legal persons, the one logically emanating from the other: First, that by law they have a separate right to act, independently from their members. In other words, they have the right to enter contracts in their own name, to create income and to incur liabilities. Second, whenever they choose to follow that

¹⁰ Harper editions, 2017.

¹¹ Together with intellectual property and human rights, but these do not belong to this analysis (and they too date hundreds of years back).

¹² See, for example, Meiners R E/Mofsky J S, *Piercing the Veil of Limited Liability*, 4 Del. J. Corp. L. 351 (1978).

¹³ See, for example, The Economist, *When death is not the end: The meaning of mortality*, 26 April 2018.

path,¹⁴ that they can only incur liability upon their own assets and not upon the assets of their members. This is the limited liability barrier. It means that organisations may go bankrupt without this affecting the personal fortunes of their founders and members. This principle has been central to the legal persons' existence and indeed the main reason for their success: Only when humans were assured that their exposure to financial risk could be foreseeable and limited, were they able to undertake more financial risk. Moreover, as Harari correctly narrates, it is risk that led to capital, which itself explains the world as we know it.¹⁵

Once the above two basic characteristics of legal persons had been established into humanity's collective imagination, the path for practically inexhaustible practical implementations was opened wide. Today any sufficiently sophisticated jurisdiction across the globe acknowledges, and regulates, several dozen of such legal persons within its geographical boundaries, each one bearing unique characteristics, strengths and weaknesses. Their transactional life is often a cause of legal friction, as well as the relationships among its members. The fact of their existence, however, has not only stopped being questioned by now, but in fact it is difficult to conceive modern life without them.

Nevertheless, a tectonic shift with regard to legal persons has taken place in the meantime. Harari was not able to identify it, because he is not a legal practitioner. However, it is evident to anybody with even a remote relationship with the law of corporations today that one of the two basic characteristics above with regard to legal persons has been seriously compromised. The limited liability barrier has long being *de facto* breached for legal persons in practically all jurisdictions across the globe. Modern accountability and transparency requirements, as well as several high-profile usurpations of the limited liability principle,¹⁶ have led to an onslaught of case-specific laws that generally carry the explicit or unspoken aim to award liability for the actions of legal persons to their managers and members. In their totality, these laws formulated a global attack against the principle of limited liability for legal persons that was launched during the past few decades that by now should be considered mostly successful.

If the limited liability principle for legal persons has been breached, what remains as the essence of a legal person today? What is actually in it? Harari perceives legal persons descriptively: Being bound by the laws of the country in which they operate, being able to open a bank account, own property, pay taxes, and be sued and prosecuted.¹⁷ To our mind, all these can be brought down to nothing more than a unique number and the right to act – the former being essential to the latter. Legal persons today are granted by the law of the land

within which they are incorporated a unique, globally acceptable and recognizable, number (be it Tax Registration Number, Commercial Registry Number, or both). Under this number, they are awarded the right to transact, to create income, and to be taxed. They thus acquire life in the real world. A life that is, however, given, taken away and completely controlled by law. It is an imagined, artificial life, tailored to their needs, or rather, to the needs that humanity wants them to serve for humanity's own ends and purposes.

3. Software: a newcomer who did not get any special treatment, but is now changing everything

Software¹⁸ entered human life forcefully some fifty years ago. However, the legal world at that time was unimpressed. What was so different about it that made its special treatment necessary? After all, recorded music, photography and movies, the latest additions by that time to works of the human intellect, had been nicely accommodated under existing legal systems, namely that of copyright.¹⁹ With a couple of twitches and theoretical constructions, software was placed under the same roof.²⁰ Notwithstanding the issue of software patents,²¹ not all voices for an *ad hoc* legal regime afforded exclusively to software, based on its unique characteristics,²² were followed through.

The interplay between copyright and patents continues to be the only legal response to software until today. In essence,

¹⁸ In this paper the term denotes only computer programs i.e. instructions that tell computer hardware what to do, and not any (personal or other) data related to them or other material and/or documentation.

¹⁹ See Widdison R ("copyright had long before become a conceptual dustbin for new technological forms of representation as they were created", Widdison R, *Software Patents Pending?*, 2000(3) *The Journal of Information, Law and Technology (JILT)*, <http://www2.warwick.ac.uk/fac/soc/law/elj/jilt/2000_3/widdison/>), as well as Christie A ("software actually has very little in common with the other new technological forms of representation that have been shoehorned into copyright protection", Christie A, *Designing Appropriate Protection for Computer Programs*, *European Intellectual Property Review*, 1994(11)).

²⁰ See Article 1(1) of Directive 91/250/EEC of 14 May 1991 on the legal protection of computer programs (as replaced by Directive 2009/24/EC) ("in accordance with the provisions of this Directive, Member States shall protect computer programs, by copyright, as literary works within the meaning of the Berne Convention for the Protection of Literary and Artistic Works"), as well as, Article 10(1) of the Trade-Related Aspects of Intellectual Property Rights Agreement 1994 (TRIPS): ("computer programs, whether in source or object code, shall be protected as literary works under the Berne Convention"). Regardless of such unequivocal wording, legal scholars did not fail to identify software's unique characteristics distinguishing it within the intellectual property system, that ultimately led to such unique (and alien) provisions on, for example, reverse engineering, interoperability or bug fixing.

²¹ This continues to be a never-ending story; for its latest installments see, indicatively, the WIPO relevant webpages ("patenting software").

²² See, indicatively, Samuelson P/Davis R/Kapor D M/Reichman J H, *A Manifesto concerning the Legal Protection of Computer Programs*, 94 *Colum. L. Rev.* 2308 (1994), as well as, Widdison R, *ibid*, and Christie A, *ibid* (each paper with rich further references on this topic).

¹⁴ Legal persons do not necessarily carry a limited liability character; Indeed, legal persons whose members carry unlimited liability through their personal assets are fairly common. However, for the purposes of this analysis attention will be given only to, essentially, limited liability (joint stock) companies.

¹⁵ P.341ff.

¹⁶ The example of Enron, that led to the 2002 Sarbanes-Oxley Act, being prominent among them, but, sadly, not the only one – far from it.

¹⁷ P.32.

the law views software solely as property – indeed, intellectual property.²³ Software is an asset that needs protection, as after all denoted by the wording of all relevant legislation across the world in effect today, where the word “protection” and its derivatives are ever-present. Until now legislators’ only concern is to protect software, by arranging what exactly is in it, who and when owns it, and how it can be sold. In other words, the law treats today software as merely a passive asset of economic value, similar to real estate or movables or even a trademark.

In the meantime, software came to dominate human life in the real world. At first, back in the 1960s and 1970s, it only constituted an ancillary to hardware.²⁴ Then, during the 1980s, it gained its independence, creating a separate market of its own – hence the property issues dealt with by the law. However, an important shift, both qualitative and quantitative, has occurred during the past few decades. Software’s economic value has exponentially increased, most likely to constitute today humanity’s most valuable asset. In addition, software increased in importance too: by now, humanity’s well-being is intrinsically connected with it. The internet, smart grid and biotechnology, to name just a few, are all fields of human activity that are dependent on software today. In essence, our world today runs on software; software is by now embedded in human life.

Such incorporation has recently shown itself capable of developing in previously unforeseeable ways. Only within the past few months, to name just a few developments that caught the world’s headlines, Saudi Arabia granted nationality to an AI robot;²⁵ the first “clash of robots” took place in Japan;²⁶ and, Bill Gates suggested that robots start paying taxes.²⁷ Taken together, these developments point to nothing less than a new form of being: Software, incorporated in Artificial Intelligence applications as well as robots, is simultaneously acknowledged by a state, put to old-fashioned, human-style conflict in arenas, and, having long now replaced manual labor, is suggested by respected technologists to be taxed. These positive arguments are accompanied with warnings on risk. Today, a global stir has been caused by Artificial Intelligence: Prominent scientists²⁸ and visionaries²⁹ have repeatedly warned humanity of the risks posed by it running, essentially, independently and uncontrolled – in other words, if software assumes life of its own.

This is not a far-fetched eventuality. Indeed, Harari, in his *Homo Sapiens* book, notes that

at the time of writing, the replacement of natural selection by intelligent design could happen in any of three ways: biolog-

*ical engineering, cyborg engineering, or the engineering of inorganic life.*³⁰ With regard to the latter, he then notes that *the third way to change the laws of life is to engineer completely inorganic beings. The most obvious examples are computer programs and computer viruses that can undergo independent evolution.*³¹ This is a point repeated in his *Homo Deus* sequel.³²

The engineering of new, Inorganic beings based on software, that may be for now restricted in academic laboratories or computer viruses but this is not likely to be the case for much longer, is a very good reason for the law to act.

4. Enter, then, the digital person

We believe that the above developments justify novel legal fiction interventions. Software has long now exceeded the intellectual property boundaries. It is no longer merely property; it has assumed life of its own. It does not matter that such life is imaginary today. Legal persons were brought to life through legal fiction intervention that was based on much less motivation – merely the human incentive for profit. Software is certainly connected today with profit, given that the world’s most valued corporations are software companies. However, it has moved much further than that, to assume in many ways artificial life of its own. We think that it is time that the dichotomy between natural and legal persons, that has served humanity so well over the past centuries, now be trisected: A new, *digital person*, ought to be added to it.

A digital person would effectively follow the example of the legal person. Unlike a legal person, it would be constituted of source code, instead of an assembly of capital or human beings. Similar to a legal person, it would be granted artificial real-world life by virtue of the law. It would be given the right to act and to transact (initially, through an individual acting as its legal representative). It would be equipped with a special set of rights and obligations. It would be incorporated either by the will and initiative of a natural or a legal person(s), or by decree of law. An administrative procedure would be followed, whereby a unique identification number would be given to it by a public administration, together with a unique tax identification number. If incorporated by a natural or a legal person(s), it would reflect their individual or collective will for all legal and transactional aims and purposes. Accountability would thus function in exactly the same manner as in the case of legal persons. A digital person would create independent income and would thus be taxed independently. It would live either in the real world (robots, drones) or in the digital realm (AI applications, online personas, software agents). It would be terminated by the will of its creators (private parties’ will or the law). Overall, it would acquire a, legal, life of its own that would very much follow the successful example of legal persons, adequately adapted to its unique features and characteristics.

²³ Even proponents of an ad hoc legal regime for the protection of software

²⁴ See Widdison, *ibid.*

²⁵ See, for example, Forbes, *Everything you need to know about Sophia, the world’s first robot citizen*, 7 November 2017.

²⁶ See <https://www.megabots.com/>.

²⁷ See Financial Times, *Bill Gates calls for income tax on robots*, 19 February 2017.

²⁸ See BBC News, *Stephen Hawking warns artificial intelligence could end mankind*, 2 December 2014.

²⁹ See Vanity Fair, *Elon Musk’s billion-dollar crusade to stop the AI apocalypse*, April 2017.

³⁰ P.448.

³¹ P.457.

³² P.50.

5. Is this the best way forward?

We believe that humanity is headed towards this direction anyway. Already drones acquire mandatory unique identification numbers in the country that they become active.³³ It is only a matter of time before robots, today fighting each other or working hidden in factory production lines, enter visibly into human everyday life, and thus acquire their own unique identification numbers in the same manner and for the same reasons as drones. The same will eventually be the case with self-driving cars. Today, all these unique identification numbers are risk-based, meaning that they are the legal response to, real or perceived, risks posed by these technologies and the software supporting them. Why then not put all these unique identification numbers to work?

The law today is practically dragged into *ad hoc* reactionary legal action, each time a new piece of software becomes tangible and perceivable and starts causing problems, for example hurting human lives. Nevertheless, being dragged retroactively into legal action is the least preferred way of regulation. It develops into fragmented, piecemeal, national-level approaches that take decades to globalize and harmonise. Copyright took more than 100 years to reach contemporary legal maturity. Data privacy is only now starting its internationalization phase, more than 50 years after the first relevant laws appeared. Can humanity wait for so long in the case of the technologies mentioned above? We do not think so. We believe that eventually legislators will be forced to provide some response the next time a drone or a self-driving car kills or injures a human being. These responses shall be neither studied nor future-proof or forward-looking. This is why it is far better to act now, in a proactive manner, awarding digital persons with legal personality, so as to study the results while they develop alongside technological developments. After all, legal persons did not reach their own level of maturity until several decades, if not centuries, had passed.

The benefits of such a leap forward by legal fiction would be substantial. A new domain of human activity would be created. Technologists would have a robust and clear regulatory framework where to place their current and future inventions (self-driving cars, online agents, internet of things etc.). Legal scholars and ethicists would be able to give clear answers and solutions to technologists raising legal and ethical questions. Bill Gates' suggestion to "tax robots" would be heard. In addition, Elon Musk's fears on the perils of AI would be alleviated, through a tailor-made, responsive legal framework.

We believe that the alternative, in other words insisting in today's risk-based *ad hoc* approach that treats software merely as property, is an open invitation to a future deadlock. Already property rights over software are challenged today through software patents, because software transcends the traditional boundaries between copyright and patent law; one can only imagine what will happen in the future, when software assumes even more subtle forms. In addition, legislators already have a hard time trying to keep up with drones, self-driving cars, robots or whatever new technology is thrown to humans

by software at it is. What will happen when, to pick-up just one of a software sub-category, different types of robots fight in arenas, help at home, work at factories, patrol the streets, or keep humans company?³⁴ There is a definite number of *ad hoc* legislations humans can devise and apply.

6. Is this idea really new? What then, give my copy of MS Word legal personality?

The idea of providing legal personality to software has, of course, not been unheard of in legal philosophy. Quite the contrary is the case.³⁵ However, we believe that legal theory has focused too long and too much on case-specific examples, such as software agents or artificial intelligence. It has tried to address complicated questions such as whether software acts intentionally or even independently,³⁶ or whether criminal liability can be brought upon it.³⁷ In essence, legal theory is trying to make software fit in what we already know, to already existing legal fiction.

³⁴ See also Holder C/Khurana V/Hook J/Bacon G/Day R, *Robotics and law: Key legal and regulatory implications of the robotics age*, (Parts I and II), Computer Law & Security Review 32 (2016).

³⁵ On this topic there exists rich, and varied, bibliography that spans several decades. Approaches generally vary from awarding legal personality to (some type of) software to protecting the digital identity of individuals. On the former see, for example, European Parliament's Report with Recommendations to the Commission on Civil Law Rules on Robotics (2015/2013(INL), 31.05.2016, as well as, Čerka P/Grigienė J/Sirbikytė G, *Is it possible to grant legal personality to artificial intelligence software systems?* Computer Law & Security Review 33(2017), Allgrove B, *Legal Personality for Artificial Intellexts: Pragmatic Solution or Science Fiction?* <https://ssrn.com/abstract=926015>, 2004, Andrade F/Neves J/Novais P/Machado J, *Software agents as legal persons*, in Camarinha-Matos L.M. (eds) *Virtual Enterprises and Collaborative Networks*, IFIP International Federation for Information Processing 2004, Chopra S/White L, *Artificial agents - personhood in law and philosophy*, ECAI'04 Proceedings of the 16th European Conference on Artificial Intelligence, 2004, Wettig S/Zehendner E, *The Electronic Agent: A Legal Personality under German Law?* 2nd Workshop on the Law and Electronic Agents (LEA 2003), Sartor G/Cevenini C, *Agents in cyberlaw*, Proceedings of the workshop on the Law of Electronic Agents, 2002, Allan T/Widdison R, *Can Computers Make Contracts?* Harvard Law Journal of Law and Technology, 1996, Willick M, *Constitutional Law and Artificial Intelligence: The Potential Legal Recognition of Computers as "Persons"*, IJCAI, 1985. On the latter see, indicatively, Sullivan C/Stalla-Bourdillon S, *Digital identity and French personality rights – A way forward in recognising and protecting an individual's rights in his/her digital identity*, Computer Law & Security Review 31(2015), Sullivan C, *Digital identity – The legal person?* Computer Law & Security Review, 25(2009), Schulz W, *Protecting the digital personhood under German constitutional law*, ITechLaw 2008 European Conference.

³⁶ Sartor G, *Cognitive automata and the law: Electronic contracting and the intentionality of software*, Artificial Intelligence and the Law, 2009, Andrade F/Neves J/Novais P/Machado J/ Neves J, *Contracting agents: Legal personality and representation*, Artificial Intelligence Law (2007), Barfield W, *Issues of law for software agents within virtual environments*, Presence: Teleoperators and Virtual Environments 2005, Karnow L, *Liability for Distributed Artificial Intelligences*, Berkeley Technology Law Journal, 1996, Gestner ME, *Liability issues with AI software*, Santa Clara Law Review, 1993.

³⁷ Hallevy G, *The Criminal Liability of AI Entities – From Science Fiction to Legal Social Control*, 2010, 4 Akron Intell. Prop. J. 171 (2010).

³³ By now, both in the USA (FAA Mandatory Drone Registration) and in all EU Member States (through applicable EU legislation).

This discussion, while waiting for new evidence to be gathered and new software to be developed, can be prolonged *ad infinitum*. At the same time piecemeal, hasty, and even unthoughtful legal responses will continue to be developed by hurried national legislators each time drones or self-driving cars cause accidents that cost human lives.

What we suggest is a fundamentally different approach: Any computer program may acquire legal personality, if law or private will decides that it is worth taking up the relevant administrative procedures. The software's "intelligence" or special characteristics are of no importance. The will of natural or legal persons or that of the law would be enough.

Being true to our suggestion, the answer would have to be positive. MS Word is indeed a computer program. Despite its ubiquitousness and even mundane presence on our desktops, If an individual wishes to take up the legal procedure, spend the resources and carry the administrative burden in order to grant artificial life to its word processor, then so be it. Once done, this copy of MS Word would presumably be able to enter contracts with corporations or individuals, create income, and be taxed. Apparently, the individual or the legal person getting into this much trouble over a word processor will have very good reasons to do so.

The MS Word example, apart from serving to demonstrate the extreme boundaries of our suggestion, also serves to make clear that rightsholders of a software package need not be involved in the legal personality process. A "professional license" may be required, as is after all the case in all computer programs today, but other than that no other requirements from the part of the rightsholder would be placed upon anybody wishing to award legal personality to a computer program. Actually, it is individual will that is important here, because it (or the law) will decide which, of the many, computer programs around us will get legal personality and which will not.

7. Why do it only for computer programs, and not, for example, for an airplane? A (space)ship? Or, a cow?

In theory, as correctly pointed out by Harari, anything that law-makers decide that can have legal personality, can do so. It is only a matter of everybody believing in such legal fiction. There is practically no limit to the types of theoretical constructions that can be awarded with legal personality within any jurisdiction, hence the multitude of corporate types to be met across the globe. Presumably, therefore, it could be suggested that, same as computer programs, each airplane or (space)ship or even a cow could also acquire legal personality.

However, humanity has not awarded legal personality either to these artifacts or to other forms of life already on the planet. We believe that this has been because of each category's unique characteristics that in turn affect the reasons behind the relevant petition. In other words, artifacts such as airplanes or (space)ships may be extremely expensive or complicated to create, however once built they assume a single functionality that can be precisely delineated and thus regulated. Accordingly, any reason behind a petition for them

to be granted with legal personality would be based not on their nature but on their economic value. Indeed, the law has obliged, and by now, for example, ships normally operate under a single-member, single-asset company. Apparently, this tacit legal treatment has been considered adequate both by legal theory and by the industry concerned, because there are no open discussions, or petitions, to the contrary. In this case, an existing legal scheme, that of legal persons, effectively accommodated extreme-value artifacts as well.

In the case of animals,³⁸ each one's unique characteristics aside, it is true that their "functionality" is not singular: They can keep humans company, or be put to work, or be slaughtered to serve dietary needs, or be used for research needs, or for a number of other purposes. However, the reason behind relevant petitions, that indeed have been raised,³⁹ is not to offer them with space to develop their full potential in the future, but rather to better protect them from human mistreatment. This is therefore a reactionary approach, or even an admission of failure for all other protective human approaches towards animals so far. However, given the finite relationships animals can develop with humanity, derived after countless years of human history, an award of legal personality to a cow would only serve to better protect its right to a life according to its needs and characteristics – not to enhance its development potential.

Human rights have frequently come to the rescue of similar regulatory impasses. Absurd legal discussion is, in principle, frequently raised on the "human rights" of corporations, animals or trees. Aside from assessing such attempts *per se*,⁴⁰ for the purposes of this analysis it is enough to be noted that the relevant suggestions are merely *protective*,⁴¹ whereas our suggestion is *supportive*. Rather than better protect software, our aim is to foster and participate, as appropriate, into its further development. The approach needed is one based on our current lack of knowledge, and hopefully proactively geared towards an uncertain future. Software's future forms cannot be known today, and speculation over them causes both excitement and concern. The current legal *protective, proprietary* approach has reached its limits, having probably served its purposes well, hence software's success. Perhaps it is now time to go beyond it, through granting legal personality to software

³⁸ Most notably, see the ongoing US case law on whether chimpanzees have the right of *habeas corpus*, and essentially whether they are legal persons see Nonhuman Rights Project Inc. v Stanley 2015 NY Slip Op 25257 Decided on July 29, 2015 Supreme Court, New York County.

³⁹ For the relevant discussion, and legislative update, see BBC News, *Should animals have the same rights as humans?*, 26 May 2015.

⁴⁰ To our mind, apart from their unlucky choice of words, such attempts at "humanization" of our real or fictional environment could be interpreted by themselves as demeaning, failing to take into account the real nature of the recipients of our attention. At any event, they divulge at best good intentions and at worst regulatory failure: Good intentions, as to the identified need to undertake (usually protective) measures to the real or fictitious recipients of our benevolence. At worst, they indirectly recognize failure of the legal solutions at hand and therefore go looking for legal tools in other, in principle, unrelated fields of law.

⁴¹ Taking into account also basic human rights theory, and distinction into positive, negative and social human rights.

so as to carefully watch it develop, assisting it or guiding it as appropriate, hopefully to the benefit of humanity.

Regulation may act *ex ante* or *ex post* a social or financial or even technological phenomenon. In the case of legal persons, it acted *ex post*, validating practices already present in one way or another since Roman law. In other cases, such as the legal treatment of software, it acted *ex ante*, fixing property issues raised by a, then, promising new field of human economic activity. In other cases, such as the EU *sui generis* database right⁴² or EU's General Data Protection Regulation⁴³ the truth lies in the middle, with legislation covering past practices and also hoping to shape the future. It is there that we believe our suggestion may be placed: taking account of the current state of affairs and planning for the future.

8. Another life

In his sequel, *Homo Deus*, Harari speaks of “the upgrading of humans into gods”, that “may follow, among others, the engineering of

non-organic beings, whereby neural networks will be replaced by intelligent software, which could surf both the virtual and non-virtual worlds, free from the limitations of organic chemistry, something that could also enable life to finally break out of planet Earth”.⁴⁴ Whether this or another vision will actually occur is irrelevant; It is also pointless, as Harari also points out, to ask questions such as what humanity wants or what it should want to want.⁴⁵ The future comes in undetermined and unforeseeable ways. What is, however, already certain, is that software shall be a crucial part or it, if not the future itself. We think that it is time humanity activated once again its legal fiction and afforded software with the legal tools to explore and exploit its full potential, at the same time with humans partaking in that future.

⁴² See EU Directive 96/9/EC on the legal protection of databases.

⁴³ Regulation (EU) 2016/679.

⁴⁴ P.51–52.

⁴⁵ *Homo Sapiens*, p.464.